Vol. III. November, 1896. No. 11.

THE VETERINARY MAGAZINE

A JOURNAL FOR THE PRACTITIONER, AND FOR THE ADVANCEMENT OF COMPARATIVE MEDICINE.

EDITED AND PUBLISHED MONTHLY BY

Simon J. J. Harger, V. M. D., Leonard Pearson, V. M. D.,
John W. Adams, V. M. D.

...Table of Contents...

PRICE, $3.00 A YEAR IN ADVANCE,
Single Copies, 30 cents.

All communications and payments should be addressed to the "VETERINARY MAGAZINE," 3608 Pine Street, Philadelphia, Pa.

TUBERCULIN

Concentrated Tuberculin.		Tuberculin Solution.	
1 c. c. (4 to 5 Injections) . .	$ 1.00	5 c. c. (2 Injections) . .	$ .60
2 c. c. (8 to 10 Injections) . .	1.90	10 c. c. (4 to 5 Injections) . .	1.20
5 c. c. (20 to 25 Injections) . .	4.50	20 c. c. (8 to 10 Injections) . .	2.20
10 c. c. (40 to 50 Injections) . .	8.00	50 c. c. (20 to 25 Injections) . .	5.20
20 c. c. (80 to 100 Injections) . .	15.00	100 c. c. (40 to 50 Injections) . .	9.25
50 c. c. (200 to 250 Injections) . .	35.00	150 c. c. (60 to 75 Injections) . .	13.85
75 c. c. (300 to 350 Injections) . .	50.00	200 c. c. (80 to 100 Injections) . .	17.25
100 c. c. (400 to 500 Injections) . .	65.00	250 c. c. (100 to 125 Injections) . .	21.50

Tuberculin Solution is supplied in hermetically sealed glass tubes containing 5 or 10 c. c. each, as desired. It is ready for immediate use. Concentrated Tuberculin is prepared for use by the addition of nine times its volume of ½% Carbolic Solution.

The Tuberculin of the Pasteur Vaccine Company (late Pasteur Anthrax Vaccine Company) is used and recommended by the **leading veterinarians** throughout the country, and can be thoroughly relied upon.

Pasteur Vaccine Company, Ltd.

56 Fifth Avenue, CHICAGO.

THE
VETERINARY MAGAZINE.

VOL. III. NOVEMBER, 1896. NO. 11,

THE BARSHOE.

BY PROFESSOR A. LUNGWITZ.
[TRANSLATED BY JOHN W. ADAMS.]

The barshoe (German, geschlossene Eisen; French, Fer á planche) seems to have had its origin in the Oriental shoe. This shoe came to our knowledge about the year 622, according to our method of reckoning time, and apparently has not always had the same form, but has varied considerably as to manner of preparation, breadth and length. In general, it represents a comparatively thin iron plate, the ends of whose branches are either laid one above the other, or are welded together, so that in the middle there is either a round opening (Turkish shoe), or a somewhat triangular opening (African shoe). The outer edge is frequently hammered in and therefore thicker than the rest of the plate, in which case the shoe extends slightly beyond the lower border of the wall. The posterior end of the shoe is more or less bent upward for protection to the bulbs of the heel.

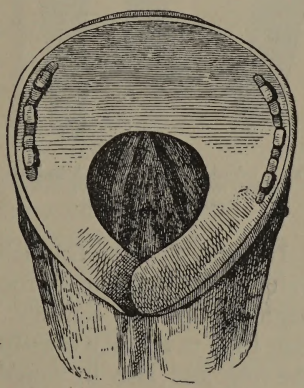


FIG. 1. Original Turkish shoe.

This Oriental shoe in its original shape, and also in a somewhat modified form in countries lying upon the boundaries of the strictly Oriental lands, has been used up to modern times,

though apparently it has never been accepted as entirely satisfactory. Its good action depends, as in every other barshoe, upon the bar.

A shoe quite similar to the ordinary barshoe was pictured by Cæsar Fiaschi in the year 1614, and even earlier by Thary in 1564. According to the latter, the ends of the branches were bent together at the heels, but were not welded together. Upon the frontispiece of Thary's work, which represents an ordinary shoeing shop, we see hanging upon the wall a shoe with a longitudinal and a transverse bar, which is apparently a representation of a barshoe. It is probable that the barshoe with both longitudinal and transverse bars has been used from Cæsar Fiaschi's time to the present; at least, old shoes that have been found seem to indicate this. Thus, for example, the museum of the Dresden School has in its possession such a shoe found in the year 1880 in a small clay valley in Walthershausen, near Gotha. This shoe has a longitudinal bar slightly removed from the median line of the shoe. The action of rust has produced a defect in the crossbar at its point of union with the longitudinal bar. This shoe (Fig. 2) weighs 170 grams, is 13 cm. long, 11 cm. wide, and in the branches 1 cm. wide. From its form and characteristics it is at least several hundred years old.

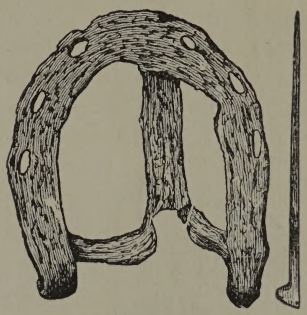


FIG. 2. Ancient shoe having both longitudinal and transverse bars; seen from the hoof-surface.

It seems that the English horseshoers began to appreciate the value of frog-pressure brought about by a crossbar, about the beginning of this century. Thus, for example, they began at that time to apply a crossbar to their shoes, to bend it toward the frog and also to round away from the horn the bearing-surface of the branches lying underneath the quarters (Fig. 3). This was evidently done to produce firm pressure upon the horny frog and, at the same time, to remove all pressure from the quarters. Coleman's patent shoe for the cure of contracted hoofs deserves mention. This shoe is in two forms: one is an ordinary open shoe with a bar, or tongue-like projection, passing back from the toe. This bar gradually increases in width

to the posterior end, and is designed to exercise pressure over the whole length of the horny frog (Fig. 4). The other form differs from this only in that the branches terminate at the quarters; in short, it is an ordinary slipper or tip provided with the longitudinal bar of the first form. This tongue-like projection is in action a true longitudinal bar, and therefore I have felt justified in representing Coleman's shoe, although it is not a true barshoe.

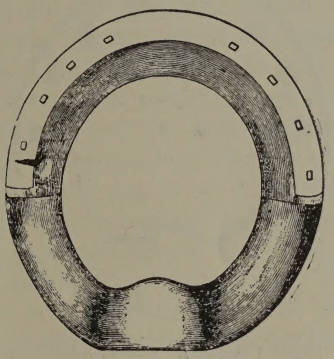


Fig. 3. Old English barshoe with bar bent upward toward the frog and bearing-surface of the branches at the quarters rounded away from the horn; viewed from the hoof-surface.

Even in later times closed shoes with longitudinal bar have been recommended in the treatment of certain diseases of the hoof, and have been used with good results. Thus, Schneider has recommended it for chronic laminitis. Yet, in spite of the beneficial action of Schneider's shoe, as attested by Joly, it seems to have been used only in few cases; otherwise much more would have been written concerning it. On the contrary, the ordinary barshoe is discussed in nearly every book on shoeing, at least in all works treating of diseases of the hoof; however, the descriptions of its preparation, characteristics, action, etc., are either brief or incomplete. Defays has written more than others concerning this shoe, and has described three different forms of barshoe, namely, (1) Le fer à planche ordinaire, the ordinary barshoe (Fig. 5). Its bar is broader than the branch of the shoe and, in order to prevent, as far as possible, slipping, which Defays fears so much, and to shift the weight more into the toe, the shoe is provided with heel calks. (2) Le fer à planche oblique ou à javart (a shoe with the bar placed obliquely, in which condition one quarter remains free

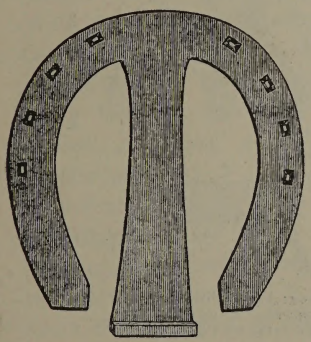


Fig. 4. Coleman's patent shoe with longitudinal bar; seen from below.

from pressure). (3) Le fer à planche à angle rentrant ou a talon coudé et réuni (a shoe whose bar is placed obliquely, and one quarter remains free from pressure). (4) Le fer à planche à queue d'aronde (a half-moon-shaped shoe with bar, from which a prolongation passes). The second and third forms are not claimed by Defays to be of any special value, and the fourth form he recommends only after extirpation of both lateral cartilages.

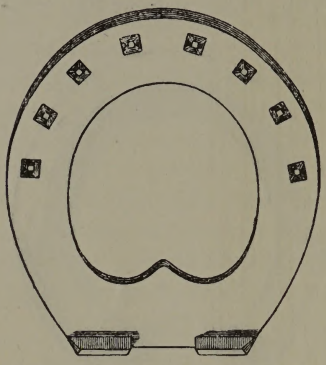


Fig. 5. Ordinary barshoe according to Degive (Belgium). View of lower face.

Only the first barshoe described by Defays (Fer à planche ordinaire) has interest for us. It does not differ materially from the barshoe in general use in Germany.

At present the barshoe enjoys a widely extended use, and properly so, because it is a corrective shoe for defective and diseased hoofs, and its beneficial action cannot be secured by the use of any other shoe. The peculiarity of the barshoe is its bar (Fig. 6*a*), that is, an ordinary iron bar joining the ends of the branches.

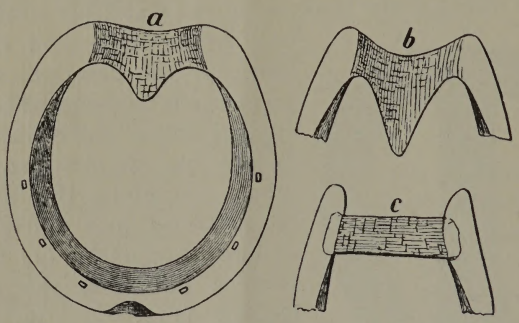


Fig. 6. (*a*) Upper face of modern barshoe; bar slightly concave. (*b*) Portion of a barshoe with beak-shaped bar for long, slanting-toed hoofs. (*c*) Bar welded on as advocated by Föringer.

The bar not only should but must vary according to the form of the hoof and the character of the horny frog. In general, it must not be narrow, but should be at least as wide as the toe of an ordinary shoe, otherwise it will press itself into

the horny frog and cause this to shrink in volume. The greater the extent of bearing surface of the bar upon the frog, the more full and vigorous will the frog remain.

Action of the Barshoe.—The barshoe transmits pressure to the horny frog and, in so doing, relieves the wall. While an open shoe is on the foot, the horny frog lies between the branches of the shoe in a more or less inactive state, but when a barshoe is applied, the bar tends to restore to the frog its natural functions; that is, the frog, by participating in the carrying of the body-weight, is again thrown into activity and assists in restoring harmony of action in the several structures of the foot; it favors, furthermore, all the physiological movements of the various structures of the foot, accelerates the circulation of the blood, increases the rate of horn-growth and diminishes the wearing away of the horn against the upper surface of the shoe. In a word, the barshoe strengthens every hoof and widens it in its posterior half; nevertheless, the anatomical relations of the various parts of the hoof require careful observance, because although pressure may be applied over the whole extent of the horny frog, yet it is only its branches that can sustain continuous pressure without injury. Pressure should be applied only over the branches of the frog, because above them are no bones, but only the soft frog or plantar cushion, whose function it is to sustain pressure and dissipate shock. On the contrary, should the bar press only upon the body of the frog, no horse could sustain such pressure continuously without being injured. It would become lame, because the pressure would be transmitted upward to the navicular bone, and the soft structures lying between the bone and the horny frog (the perforans tendon, soft frog and keratogenous membrane) would be cruelly pinched.

Indications for its Use.—The barshoe can be used with great advantage in all those cases where, (1) from any cause the bearing surface of the wall, either in part or in entirety, should be relieved of weight; (2) where one wishes to arouse the dormant functions of portions of the hoof, to regulate them, to strengthen the hoof and, thereby, to increase the working power of the animal.

Furthermore, the barshoe is of value particularly where the entire hoof is weak; where it has weak quarters, or is awry (Schief), or has a flat or dropped-sole; in chronic laminitis;

where the foot is contracted or there are corns or solutions of continuity of the horn capsule, such as cracks of all kinds, especially cracks of the bars. It is also useful in the treatment of horn-clefts, loose and separated and hollow walls, and in case of defects in the lower border of the wall.

The barshoe is contra-indicated, where there is ossification of the lateral cartilages, navicular disease, penetrating street nail, canker of the frog, inflammation of the heels, and other injuries to the fleshy frog and plantar cushion.

Disadvantages.—By reason of being slightly heavier than the ordinary open shoe, the barshoe to a very slight extent favors slipping, though this disadvantage may be disregarded as of little import. The chief disadvantage lies in the fact that the bar lies in permanent contact with the frog, and if the shoe is not properly fitted, produces a permanent pressure upon the frog, even when the hoof is not bearing the weight of the body. Such a condition may give rise to atrophy of the horny frog. While an atrophied frog does not contra-indicate the use of the barshoe, it weakens the action of the bar. Therefore, the fitting of a barshoe requires considerable care and experience. If the pressure of the bar upon the frog and the condition of the frog receive proper attention, the barshoe may be used continuously year after year without any disadvantage.

Choice of Shoe.—As every ordinary shoe must be chosen with respect to the form of the hoof (viewed from the side), the nature of the animal's work and the character of the ground-surface, so is it with the barshoe. The form of the hoof is of especial importance. For "stumpy" hoofs, namely, those with upright walls, high heels and steep toe, and for hoofs of normal shape, we use the form of the bar indicated in Fig. 6 *a*, for in such a case the shoe does not need to be very long. Hoofs with long, slanting toes, on the contrary, require that form of bar indicated in Figs. 6 *b* and 6 *c*. (Heavy horses require this form of bar more often than horses of lighter build.) The bar shown in Fig. 6 *b* has the form of a boat's prow and is concave on its posterior edge. This form of bar makes it possible to use a shoe sufficiently long for the foot and, at the same time, to obtain proper contact of the bar with the horny frog. In Fig. 6 *c* the bar is an ordinary cross-piece placed some little distance in front of the ends of the branches, and

welded on after the shoe has been shaped. Föringer has called the latter shoe "stegeisen" and has urged for its use the following advantages:

1. This form of shoe is indicated, (*a*) where the slant of the toe and fetlock axis, viewed from the side, and the shape of the fetlock and condition of the tendons call for long branches; also, in the case of a frog which is short and does not reach far enough backward (long, low, overhanging heels, and long, slanting toe) to rest properly upon the bar of an ordinary barshoe. (*b*) When "forging" or "interfering" make it necessary to reduce the length of the branches of the shoe. (A barshoe for forging or interfering, in which the bar is not set well forward, is not to be considered.) (*c*) In cases where it is necessary to widen the bearing-surface of the shoe either in whole or in part; in the most favorable of such cases the ordinary barshoe will be too heavy and clumsy for use. (*d*) In case it is necessary to place permanent heel calks upon the shoe, as is often desirable on shoes to be used in the country.

2. The "stegeisen" allows us to get a much greater bearing-surface on the horny frog, and this is of especial value on large, broad frogs which reach well forward, as are so often seen in flat feet, having the walls at the quarters separated from the sole. Inasmuch as this form of hoof is especially prevalent in country districts, a more extended use of this shoe in such places would be of advantage. The ordinary barshoe usually exerts pressure over altogether too small a portion of the horny frog.

3. The "stegeisen" can be made easily and quickly out of any old shoe. This fact makes it possible to use a shoe which has already been fitted, and therefore has a shape and form corresponding to that of the hoof, and will not require refitting, an advantage to be especially considered in relation to journeys and marches and during army manœuvres. The use of the ordinary barshoe, on the contrary, requires more time, skill and material, and in all cases the making of a new shoe, its shaping and fitting.

4. An ordinary open shoe with heel calks may be changed to a "stegeisen" without difficulty and loss of much time, and afterward, if it be necessary, the bar can be easily removed; such is not the case, however, with the ordinary barshoe.

5. The "stegeisen" may be made lighter in weight, and therefore will require fewer nails and will be less frequently lost. Again, the bar may be made much thinner than in the ordinary barshoe, in which the bar at either end, at least, must be of the thickness of the branches.

6. The "stegeisen" is more fully covered up by the hoof than the ordinary barshoe, which can always be seen from behind, even when the horse is standing upon the hoof. This fact is of importance in horses used for pleasure. While the ordinary barshoe, viewed as a work of art upon the anvil, may be a source of pleasure to the horseshoer, when placed upon the foot it does not have the advantages of the "stegeisen."

7. The bar of the "stegeisen" may be placed forward or backward at will, according to the shape and character of the frog, which cannot be done with the ordinary barshoe. In the latter the posterior edge of the bar usually projects behind the frog, where it is of no use. If the bar sustain its proper position with reference to the frog the shoe will usually be too short.

In Switzerland there is in general use, especially on horses with flat feet, a barshoe in which the bar is not welded to the shoe, but is formed by hammering out the inner web of the branches until the iron from both sides meets in the centre (Fig. 7). This shoe has considerable resemblance to many forms of the Oriental shoe, and yet does not have the disadvantages of the latter. Its greatly broadened branches completely cover the frog, bars and branches of the sole.

It must be admitted that this shoe acts well, because it furnishes a large surface of contact with the hoof, is capable of taking weight from walls that are too sloping and weak to bear much weight, and diminishes the descent of the branches of the sole, which is particularly marked in flat feet.

Making of the Shoe.—A barshoe is somewhat more difficult to make than an open shoe. The bar from which the shoe is to be made should be from three to eight centimetres longer than a bar for an ordinary open flat shoe. If "fullering" and concaving are desired, neither should be prolonged too far toward the end of the branches. The end of each branch of the shoe is bent at a right angle, or even at an acute angle, over the edge or the horn of the anvil, then beveled, placed one above

the other and welded together. A shoe in the rough should be somewhat thicker, that is, more "fleshy," from the last nail-hole to the end of the branch, than it is at the toe. It must also be slightly narrower than the hoof for which it is destined, because in afterward shaping the shoe and working out its surfaces and in moulding the bar, the iron will become wider, and this will be especially the case if the bar requires strong concaving, which will stretch it out, or holes are to be punched in the ends of the branches for the reception of heel calks. Count Einsiedel has remarked upon this point, that the bar and quarters of a shoe in the rough should always be thicker than the shoe at the toe and middle part.

The ordinary barshoe requires but one heat for welding, and that in the middle of the bar, while the "Stegeisen" of Föringer requires two heats, one for each end of the bar. Of course, such a bar can be fastened by screws, though there is no good reason why a bar should be fastened in this manner.

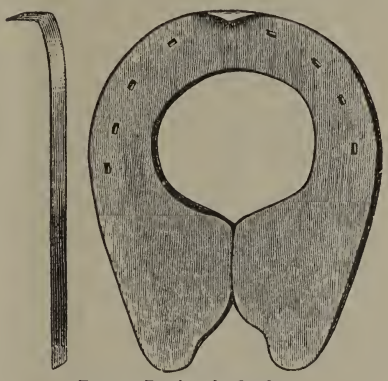


Fig. 7. Barshoe for flat feet. (From Berne, Switzerland.)

Shaping and Fitting the Barshoe. — Although the barshoe is used principally for defective and diseased hoofs, yet it may be used as well upon sound feet, and I agree entirely with Gutenäcker, who says that a barshoe is that shoe which, when placed upon healthy hoofs, will maintain them in a healthy condition. Of course, to obtain the best results, a barshoe must be most carefully shaped and fitted, with especial relation to the various peculiarities of the shape of the foot. The bearing-surface of the shoe must be smooth, as broad as possible and horizontal at the branches. In the region of the nail-holes the upper surface may incline slightly inward so that the inner edge of the shoe is about the thickness of ordinary pasteboard below the outer edge; such a disposition of the bearing-surface of the shoe probably assists in the conservation of the hoof. The concaving must be at least so deep that the shoe will remain one-eighth of

an inch removed from the surface of the sole. The outer edge of the shoe (the peripheral surface representing the thickness of the shoe), should slant in accordance with the form of the hoof and the nature of the lower edge of the wall; that is, sometimes it should be beveled downwards and away from the shoe (base-wide), sometimes beveled downward and toward the shoe (base-narrow), or as in an ordinary shoe. The toe and side-clips must correspond, as to height and position, to the form of the hoof and the service of the animal. It is absolutely necessary that the shoe be straight, that is, not twisted (windschief); it is straight when one branch exactly hides the other when the edge of the shoe is held before the observer's eye. A barshoe without toe calk should always be bent slightly upward at the toe, the degree of upturning depending upon the nature of the animal's gait and the character of the ground; yet the shoe should not be funnel-shaped. The number, distribution and direction of the nail-holes will depend upon the form of the hoof, the nature of the bearing-surface of the wall and the quality of the horn.

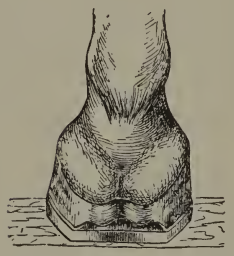


FIG. 8. Left fore hoof shod with barshoe. Branches of the frog on a level with lowed border of the wall at the quarters.

The shoe fits, (1) when the nail-holes fall exactly upon the "white line"; (2) when, in case of contracted walls, the outer edge of the shoe touches a perpendicular line dropped from the coronary band above; (3) when it exerts uniform pressure at all points and does not rock, as can be ascertained by digital pressure alternately upon the bar and the toe, or alternately upon the inner and outer branches. The shoe should fit the entire circumference of the foot so closely that even air cannot pass between the two; over the frog, however, the pressure should be very light. In exceptional cases greater pressure should be thrown upon the frog, though it should never be maintained for more than one or two shoeings, and should be repeated only at long intervals, otherwise the frog may undergo atrophy. Sometimes the greatest care is necessary to secure a proper adaptation of the bar to the branches

FIG. 9. Left fore hoof shod with the barshoe. (*a*) The interspace to be filled.

of the frog. Presupposing that there is no thrush of the frog, three peculiarities of form must be considered; namely:

1. When the branches of the frog are on a level with the lower border of the wall at the quarters, the bar will require little or no attention, for in this case it will exert a proper amount of pressure and will require no change of form or direction (Fig. 8). A somewhat more prominent frog makes it necessary for us to slightly concave the upper surface of the bar. (Fig. 6).

2. When the frog does not grow down to a level with the wall at the quarters, that is, lies more or less deep in the centre of the foot, there remains an interspace between bar and frog, (Fig. 9*a*), in which case it will be necessary to bring the bar into indirect contact with the frog by means of interposed material such, for instance, as patent hoof plaster (Hufleder-kitt). Schwentzsky has recommended a similar plastic mixture composed of equal parts of yellow wax, crude turpentine, shoemakers' wax and common resin. Gutenäcker recommends gutta-percha. The interposed material must, of course, be placed in position before the shoe is nailed to the foot. The use of leather (Einsiedel), or caoutchouc (Kalning) is not in any case to be recommended. Plastic material is always better, for it adapts itself perfectly to the form of the frog, and transmits the pressure of the bar uniformly.

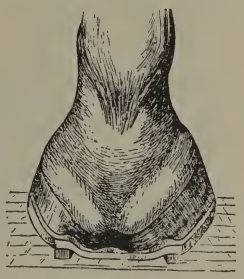


FIG. 10. Right fore hoof shod with barshoe, whose bar is bent downward.

3. Frequently in flat hoofs or in those with a "dropped sole," the frog extends considerably beyond the level of the wall at the quarters. In such a case the bar must be bent downward, as Pescheck has correctly observed. Inasmuch as, by this act, the level under-surface of the shoe is destroyed, stability must be given the shoe by placing screw-calks at the heels. (Fig. 10). These calks also protect the bar from a too rapid wear.

Taking Pressure from the Quarters.—This is done by preventing contact of one or other quarter of the hoof with the shoe, and is accomplished either by cutting or rasping away the horn from the part to be relieved of pressure, or by hammering the upper surface of the branch of the shoe until the

latter is about one-half its original thickness. The latter procedure is followed upon hoofs where there is a paucity of horn, the former where there is plenty of horn to be removed. However, we should be careful that such measures do not cause the shoe to rock upon the foot, or allow the foot to spring down upon the shoe; on the contrary, the shoe must always remain firm and immobile if the best results are to be attained. Before removing pressure after the manner indicated, one should always ask himself whether or not the portion of the hoof made free can be kept free during the entire period that the shoe will be carried, and if this is not probable it will be well to distribute some of the body-weight over the sole by employing either a leather sole with packing, or some form of pad placed between the branches of the shoe.

Quarters which are painful on pressure should be kept from one-twelfth to two-fifths of an inch distant from the shoe, the distance depending on the quality of the horn, the form of the hoof and the weight of the body. The farthest removal of the horn from the iron is necessary in heavy draft horses with elastic, acute-angled hoofs, because experience has shown that such hoofs, more than any others, tend gradually to settle down upon the shoe. We should never attempt to leave both quarters free unless absolutely necessary. One or other quarter may be left free without injury and can easily be kept so.

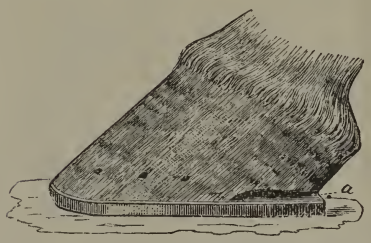


FIG. 11. Long-toed (acute-angled) hoof with lowered quarter (*a*).

Should it be necessary to take pressure from the toe or side of the hoof, one-twelfth of an inch will be sufficient.

The use of the Barshoe upon a Hoof affected with Thrush of the Frog.—Formerly the presence of thrush was supposed to prohibit the use of the barshoe, because the pathologic process in the frog is favored by the filth which collects between the bar of the shoe and the horn. At present, the existence of thrush of the frog is no reason why a barshoe may not be used. If for any cause a barshoe seems to be indicated, the following procedure, which in my experience has never failed

and which excels all other procedures in simplicity, cheapness and prompt action, is recommended.

After the barshoe has been fitted, by means of a sharp hoof-knife of medium or small size remove all diseased, undermined horn, wash the region thoroughly with a 3-5 per cent solution of carbolic acid in water (or five per cent creolin solution), dry the horn and smear the cleft of the frog and the horn-sole thickly with liquid tar; twist rolls of oakum moderately tight and sufficiently large to fill the median and lateral clefts of the frog and press them firmly into these spaces. Then place enough more oakum over the surface of the sole so that the shoe bearing its leather sole will require moderate pressure with the fingers to bring it into perfect contact with the lower edge of the wall. This pressure should be greater or less as the sole is thicker or more sensitive. It is impossible to indicate by words the amount of pressure suitable to different cases; one must judge of this by his muscular sense.

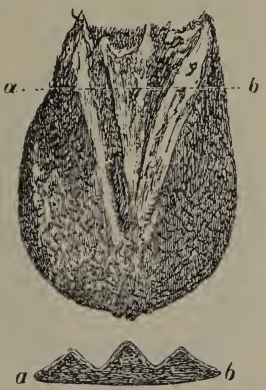


Fig. 12. Tar and oakum filling from sole and frog. *a-b*, section of the same.

For the leather sole we use dry sole-leather of medium weight. The leather should be riveted with small nails to the ends of the branches or in the middle of the bar, at which points extra nail-holes are placed. The nail-holes are then burnt through the leather by means of a hot punch, the shoe and leather dipped into water to render the leather soft and yielding, and then placed in position and fastened to the hoof with ordinary hoof-nails. It should be remarked, however, that a shoe to be used with a leather sole should be somewhat wider than one without a leather sole. If the preceding directions have been faithfully observed, the action of the shoe will be in the highest degree satisfactory. A new, strong and healthy frog will replace the diseased one.

Furthermore, it may be said with positiveness that the barshoe with leather sole is of exceeding benefit in all diseases of the hoof with the exception of those in which, from various causes, the sole can sustain little or no pressure. On account

of the wide range of usefulness of this shoe, it deserves the preference, almost without exception, over every other form of pad or packing. It is cheap in price and can be made anywhere. Of course, its value depends largely upon the proper filling or packing of the sole and lacunae of the frog. This filling or packing, which on removal of the old shoe with its leather, shows the exact imprint of the plantar surface of the hoof (Fig. 12), distributes the pressure of the body-weight, or the resistance of the earth, over the entire plantar surface of the hoof, prevents the hoof from drying out, dissipates shock, tends to expand the hoof, protects against penetrating bodies and balling by snow.

The disadvantages of the leather sole manifest themselves only when too little filling has been placed between the leather and the hoof; in this case dirt, sand, etc., filter in from behind, accumulate around the point of the frog, press the leather away from the foot, and by causing increased pressure upon this region, may cause lameness. I know of no other disadvantages.

Fig. 13. Faulty barshoe, with bar too narrow and bent downward away from the frog. (From Moscow, Russia.)

There are, indeed, other materials that may be used between the wall and shoe and for filling in the sole and frog of diseased or defective hoofs, but when one wishes to guarantee either an improvement in gait or an improvement or cure of the hoof, he should choose the leather sole. Whenever with barshoe and leather sole, and strong pressure over the plantar surface of the hoof, we wish to prevent slipping, a rubber or felt pad may be placed over the leather between the branches of the shoe.

Now that I have spoken sufficiently concerning the fitting of the barshoe and with regard to the position of the bar upon the horny frog, I may add that my remarks are based upon an experience of many years. In the Dresden Horse-shoeing School from 1879 to 1894 were put on 336,025 shoes, of which number exclusive of bar-rope-shoes, 14,280 were hand-made barshoes—4.25 per cent. Those horseshoers who make the

bar of the barshoe narrow, round or angular, or who bend it away from the frog so that it assumes the shape of the handle of a pitcher and bridges over the frog without touching it, have not the least idea of the use of a bar. Barshoes of this kind (Fig. 13) are in general use in Russia, particularly in Moscow. A similar shoe seems also to be much used in Brazil.

Sore-Footed Horses.—I have learned, like many other shoers, from experience, that horses whose work requires nearly all their travel on paved streets—brick, macadam, or asphalt—require more painstaking and careful as well as skillful shoeing. The longer the animals are used on streets so paved, one of the results from the friction caused by the constant contact of the foot with the hard substances traveled over is heat; the shoe at times becoming so hot, from the heat engendered, that it will cause pain to the naked hand when touching the same. The feet, therefore, become dry and hard, from lack of moisture either on the streets or in the barn, and nature's laws, so violated, start the equine on the road to the "bone-yard" very soon, in many cases assisted with poor shoeing. I always apply a remedy of mine and in a few days the horse finds relief, and for the benefit of the craft I will insert it here: Take mutton suet, beeswax, shoemaker's wax in equal parts and melt together, and, after fitting the shoe, punch a hole in each heel and rivet a piece of stiff leather to the shoe; spread the salve on the foot as you would butter on bread. Next take some oakum, lay it lengthwise from the end of the heel, between the heel and frog, press it in with the clinch cutter as firm as possible on both sides; then lay some more oakum on top of the frog, not too much, but just enough to keep out the dirt, covering the whole with more salve. Try the shoe, and after you are satisfied you have relieved the heels of pressure nail it on. In a few days you will find the animal going sound, and all right. The preparation keeps out the dirt and does not rot the foot as tar will, which is resorted to by many in such cases. You will see that the heat of the foot keeps the salve at the right temperature, and when the shoe is pulled off, at the end of the month, the pad will come off like a porous plaster and leave the foot in perfect condition to pare and no fever or soreness will be left.—Richard Moxley, *Horseshoers' Journal*, December, 1896.

SELECTIONS.

TREATMENT OF SPAVIN.

By Klemm-Stralsund.

As to the nature and treatment of ordinary bone spavin, opinions are still at variance on all essential points; even as to its origin no unanimity of opinion has yet been reached. Möller* says, that, "at present there is no doubt that a chronic arthritis is the forerunner of spavin," and that the bone spavin (exostosis) develops secondarily, "that is, after the inflammatory process has passed over to the periosteum from the joint surfaces." But this theory must be opposed, for, if it be correct, we must admit that a horse may have an inflammation of the joint without increase of local temperature, swelling, or distension of the synovial membrane, and even without lameness, before he develops an exostosis; this, however, is inconceivable, particularly in the case of the hock. The fact that, usually, when the lame animal is placed under veterinary supervision, a considerable hard, bony enlargement of some standing is found, ought rather to be interpreted as indicating that the exostosis is a result of local, narrowly circumscribed periostitis which existed for some little time without causing lameness, as in the case of splints, curb, etc., which affections Möller accounts for in this way.

If we wish to ascertain the origin and then to deduce the treatment of spavin, we should not seek to find out whence comes the chronic arthritis, but to learn why a periostitis so often arises over this same small area of the bone. In discussing the origin of spavin Möller mentions the theories of Rychner, Lafosse, Dieckerhoff and Peters, and commends the last as being most nearly in accord with his own views. However, it seems to me that Peters' theory of rotation is destroyed by facts. According to this theory spavin occurs most frequently in loose-jointed horses whose hocks permit of greater rotation than

*Special Chirurg, 1894

normal, in which case any hindrance to rotation must produce excessive injury; and least often in horses whose limbs have but little freedom of movement (short, stilty gait). On the contrary, spavin occurs by far more frequently in horses with upright pasterns, steep-walled hoofs, "bear-feet" (a stumpy foot attached to a long, low, sloping fetlock), or "camped behind," and is prone to appear if such horses travel with the quarters of the hoof pared down too low, although this state renders the twisting of the foot upon the ground much easier. Finally, Peters' theory of the origin of spavin receives a set-back by the fact that most horses, lame from spavin, travel better with high heel-calks, though these render twisting of the leg more difficult, than they do upon a flat shoe. Nevertheless, we must admit that there are definite exceptions to this rule, namely, that all horses lame with spavin, which continue to place the hoof flat on the ground in traveling, go essentially worse with high heel-calks.

Inasmuch as the old theories of the origin of spavin did not seem to me to be sufficiently comprehensive to account for all the facts, I announced in 1872 another theory, which Möller has not thought well enough of to mention. He has, however, given prominence to his opinion that the spavin operation recommended by me, namely, subcutaneous section of the flexor metatarsi muscle and tendon, has been of no value in his hands. He further says: "If divided completely, lameness follows similar to that after rupture of the muscle. By giving from four to six weeks' rest the joint may become anchylosed, and lameness disappear, but this often fails to occur. Partial section sometimes disguises the stringhalt-like lameness, but cannot cure the disease of the joint, and the owner generally returns after an interval to submit the horse to further treatment." From the precited quotation from Möller's "Special Surgery" I perceive that in my article* I furnished the opportunity for a misunderstanding, and, secondly, that the time has now come when I should make public the improvements to the operation which have been suggested to me while performing it about one hundred times.

I was not careful to make it clear in the essay mentioned, that after section of both the tendinous and muscular portions

---

*Archiv. für Thierheilkunde, 1887: "A New Spavin Operation."

of the flexor metatarsi, the very same disturbances of locomotion are produced as occur after rupture of these structures; indeed, at that time I believed that complete section of both tendinous and muscular parts of this flexor was unnecessary, and therefore recommended section of the tendinous portion only, and at most only a portion of the muscle. Even then I had observed that this operation did not completely remove the lameness in many cases, but that a complete section of both parts of the flexor metatarsi—producing the symptoms of rupture of these structures—was nearly always followed by a complete cure. Now, since Möller scrupulously avoided complete section in order to avoid the locomotory disturbances referred to, the unsatisfactory results from some of his operations are explained. I now believe that complete section of both parts of the flexor metatarsi, resulting in the much-dreaded disturbances of locomotion in their most pronounced form, is the surest way to a complete removal of spavin lameness.

I proceed as follows: When certain of my diagnosis, I cast the animal so that the lame leg is uppermost. The hair is shaved from a small area in the middle of the anterior tibial region and the skin thoroughly disinfected. Locating the tendinous part of the flexor metatarsi, which is easily felt as a tense cord of the thickness of the thumb, I make just posterior to it a puncture through the skin of sufficient size to admit a blunt-pointed tenotome. (See Hauptner's Catalogue, 1893, cut 760.) I pass this instrument, turned upon its side, forward underneath the skin and fascia till it reaches the inner edge of the tibia, turn the cutting edge backward and quickly cut through both tendon and muscle of the flexor metatarsi, sweeping the rounded end of the blade backward on the surface of the bone. Since the horse will struggle violently on feeling the pain, the knife must be instantly withdrawn after making the rapid section, otherwise, by reason of the exceeding looseness of the skin at this point, a large skin-wound may be produced. A soft crackling sound indicates section of the tendon, but I make sure by noticing whether or not the tendo-Achilles of the leg operated upon has become less tense than the other. In doubtful cases I pass the tenotome a second time and divide any muscle remaining, at the same time with the tenotome feeling distinctly the rounded belly of the anterior extensor of the phalanges just posterior and, of course, uninjured. The wound is closed and

treated according to general surgical rules, and the animal allowed to rise. He should now stand and move precisely as he would had he sustained a rupture of the flexor metatarsi; if he does not, then section has been incomplete, and I cast him again without delay, in order to find and divide the portion left intact. Success is assured only when the animal shows the well-known dragging, wavering action of the limb, indicative of rupture.

The animal operated upon in this manner should be given absolute rest for four weeks; he may be exercised at a walk during the next two weeks, given light work during the seventh and eighth weeks, and then allowed to do full work. Heavier work at an earlier date is apt to cause rupture of the incompletely-healed muscle, and make it necessary to confine the animal to the stable for a much longer period, though even this undoubtedly increases the certainty of removal of the spavin lameness.

This operation may be performed for both acute and chronic spavin, though I do not so willingly operate on recent cases, because, in one instance, operation for acute spavin was followed by a very large exostosis, though the lameness was removed. Since I have been operating as described, I have had but few cases turn out badly, viz.: (1) In one case the divided muscle failed to reunite, so that the animal had to be destroyed (I once saw failure of the muscle to reunite after rupture). The reason for this rare occurrence has never been satisfactorily explained. (2) In one case, improvement was very gradual, the lameness not entirely disappearing till the end of six months, and in another case seven months. I explain this continuance of lameness to my own satisfaction, by the persistence of pain in the exostosis at the termination of the tendon. The pain in the bone can be made to disappear rapidly by applying a sharp blister or the actual cautery over the region of the spavin. Of course, those who are opposed to the operation claim that the chief benefit is derived, not from the operation itself, but from these latter supplementive measures; the objection however, may be set aside as unimportant, because the essential fact remains that the treatment is highly successful. (3) Several animals operated upon continued to be somewhat lame when beginning work during a year or more, but were capable of doing their full work. (4) The operation in

my hands has never been a complete failure, except when a false diagnosis had been made. (5) Return of lameness after soundness of more than a year has happened; this must be ascribed to a new invasion of the disease, and requires a repetition of the operation.

The above-described operation is a noteworthy improvement upon the procedures in use today, and its results gain by comparison with those of all other methods. It should, at least, be accorded a trial after all other methods have failed, and even then it has been my experience and that of many of my colleagues that many such animals have been completely cured.

Finally, in no case in which my operation has been partially unsuccessful, have I ever known any other treatment to subsequently effect a cure.—*Berl. Thierärztl. Woch.*

THE VALUE OF TUBERCULIN.

The Minister of Agriculture in France recently appointed a commission from the members of the Academy of Medicine of Paris, to investigate and report concerning the diagnostic value of tuberculin, in tuberculosis of cattle. Inasmuch as the incipient stages of this disease cannot be recognized by physical examination, some means is desired whereby an early and certain diagnosis may be possible. According to extensive experience, especially by the eminent Professor Nocard, we possess such a means in tuberculin, for this agent gives us a sure and specific reaction which begins from twelve to fifteen hours after subcutaneous injection of from three-tenths to five-tenths of a c. c., and consists of a rise of temperature of from 1½ to 2½° C. In very advanced stages of tuberculosis, where the disease is easy of detection by ordinary physical examination, tuberculin may give no characteristic reaction. Many objections have been raised against the use of tuberculin by its opponents. The chief of these objections are the following:

1. Healthy animals may be made tuberculous by injections of tuberculin. The use of high temperatures in its preparation and the addition of phenol render this objection invalid.

2. It sometimes happens that animals known to be tuberculous give no reaction. It must be admitted that this is

exceptionally the case, but it happens in animals in which the disease is so far advanced that these exceptions may be cast aside as of little importance.

3. Tuberculin sometimes produces a decided reaction in healthy animals. This objection may be met by the statement that, according to the experience of Nocard and other investigators, a tuberculous focus must always be present if a decided reaction has occurred. In order to find such a focus it may be necessary to institute so careful an investigation that the value of the flesh for marketable purposes will be destroyed.

4. The statement has been made by opponents of tuberculin, that certain other diseases of internal organs give rise to symptoms similar to those produced by the action of tuberculin; but experience has shown that when a decided reaction has followed tuberculin, the animal has been tuberculous.

5. That tuberculin has the power of arousing latent tuberculous foci and producing a much wider spread of the disease. To this objection we must oppose the experience of Nocard, who from more than three thousand tuberculin injections has only in three cases, and those far advanced in the disease, observed aggravation of tuberculosis by tuberculin injection.

6. That after one reaction from the use of tuberculin the animal's ability to react is lost. This has been observed but very rarely and only in animals in which the tuberculous foci were very small and few in number and, therefore, where the danger of a spreading of the disease is minimal.

Moreover, such a failure to react to a second injection can only occur when the interval between injections is too short. After an interval of a month the ability to react is fully restored.

The Commission are of the opinion that no task is easier than to free a herd of tuberculosis. Every animal should be examined with tuberculin, the sound ones isolated in a disinfected stable and only sound animals afterward brought among them. The diseased animals should be fattened and slaughtered as soon as possible, in case the tuberculous process is still somewhat limited in extent and the flesh can be eaten without danger.

In conclusion, the Commission submitted the following resolution, which was endorsed by the Academy:

"Tuberculin is an invaluable agent for the diagnosis of tuberculosis, is entirely reliable, and is heartily recommended."

NOTES ON THE ADMINISTRATION OF CHLOROFORM AS AN ANESTHETIC TO THE DOG AND CAT.*

By F. Hobday, M. R. C. V. S.
Royal Veterinary College, London.

In a text-book on canine diseases, written as recently as 1893, the following paragraph occurs: "Dogs are notoriously bad subjects for chloroform, and the pretense of keeping a dog anesthetized for two hours whilst vivisectional experiments have been performed is nothing more than a pretense. No dogs will survive chloroform for two hours, or for one, and very few recover from complete anesthesia so produced for ten minutes."

From inquiries that I have made among professional friends, I am led to believe that the opinion expressed in the foregoing quotation is very commonly held, and that many veterinary surgeons consider that the administration of chloroform alone to dogs is attended with very great risks.

The following statistics will, I think, be of value in showing that chloroform alone can be administered to dogs with perfect safety, and that the risk of accident does not lie in the action of the chloroform so much as in the method of administration.

Of course, I do not mean to say that a mishap will never occur; but I do think that, if it is administered properly, death should not result unless in cases in which some definite cause is discoverable on post-mortem examination.

The cases mentioned below have occurred in the free clinics of the college. The chloroform was administered in the form of vapor by means of an inhaler, two patterns being used, viz., Junker's and my own.

Each apparatus is formed with the idea of administering only the vapor of chloroform, thus preventing the rubefacient and after-irritant effects of this anesthetic when placed in contact with the lips.

Anesthesia can be produced very slowly and carefully, as the amount of vapor which is allowed to enter can be absolutely

* Journal of Comparative Pathology and Therapeutics, December, 1895.

controlled, and its admixture with plenty of air insured, by means of a tap. On the slightest sign of danger the ingress of vapor can be stopped, air allowed, and antidotes applied.

The main point of difference between the two inhalers is that Junker's apparatus forces a stream of air through chloroform into a mask which fits over the nose and mouth, whilst my apparatus sucks or pumps a stream of air and chloroform into the inhaler. I consider that this latter method gives a much greater control over the amount sent into the mask, and thus affords greater safety. This latter point is of especial importance to veterinary surgeons, who are not always able to obtain the friendly services of a qualified man as anesthetist. The idea was suggested to me by seeing the death of Case 24, when the animal was chloroformed for the second time ; being over confident of Junker's apparatus I left it in the hands of a student, who gave the chloroform too quickly and with fatal effect. About one-third of the cases mentioned in the list* were chloroformed by Junker's, the remainder by the other apparatus.

Experiments with Dogs.

Case 14.—May 4, 1895. Irish terrier bitch, twelve weeks, healthy.

9.30 a. m. Temperature 101.1°.

9.48. Chloroform inhaler applied, the vapor being forced vigorously.

9.49. Whimpered, slight excitement.

9.50. Completely under.

9.51. Respirations suddenly became shallow. Removed inhaler and hobbles at once. Applied artificial respiration and cold affusions to the head.

9.55. Recovering, out of danger, applied amyl nitrite to nostrils.

9.58. Temperature 101.2°.

10.00. Could stand, but walked very unsteadily, otherwise all right.

Had used 30 minims of chloroform.

The chloroform was forced too quickly at first, especially as the patient was so young and not in good condition.

---

* Only the more instructive cases of the "list" presented by Mr. Hobday are noted in this abstract.—Ed.

Case 70.—The temperature at the commencement of anesthesia was 102.3°; forty-five minutes later 101.2°; one and a half hours after this 98.8°; forty minutes later 94.8°; and when the whole was removed 94°. The pulse at this last stage was 128, regular and strong.

Recovery was hastened by the aid of a hypodermic injection of ether 20 minims, the animal being able to walk in twenty minutes.

About two hours later (the animal apparently all right, temperature 101.4°) an attempt was made to produce anesthesia by applying two drachms of chloroform on wadding and a towel folded four times. In two minutes unconsciousness was produced, and one minute later respiration suddenly ceased, the pulse also becoming imperceptible. On removal of the towel the pulse again became distinct and regular, being perceptible for five minutes after respiration had ceased. The temperature was still exactly 101.4°.

Post-mortem five minutes later.—There was a distinct smell of chloroform on opening the chest. Lungs, anthracosis; otherwise normal. Heart, right auricle and ventricles almost empty. The tricuspid valve had exceedingly large vegetations on each cusp. Bicuspid valve had exceedingly large vegetations on each cusp.

Fifteen minutes before the third time of chloroforming a hypodermic injection of the following was given:

R

Atropiae sulph. . . . . gr. $\frac{1}{40}$

Morphin hydrochlr. . . . . gr. $\frac{1}{8}$

Aquae . . . . . mx.

After twenty minutes of anesthesia the breathing suddenly became shallow, but was improved by removing the chloroform and allowing inhalations of amyl nitrite. For the next twenty or thirty minutes the patient lay still, as if in a deep sleep, from which she was aroused by stimuli, but into which she again speedily relapsed. She eventually recovered all right.

Case 73.—A month later she was again chloroformed with sponge and towel very cautiously. In one minute anesthesia was produced, and it was maintained for fourteen minutes. Suddenly, without any warning, the respirations ceased, the

heart still beating ; after artificial respiration and application of amyl nitrite to the nostrils the breathing recommenced. Chloroform was again applied, but respirations suddenly ceased one minute later. The heart beat distinctly for six minutes afterwards.

Post-mortem.—Heart, valves normal ; right auricle and ventricle contained a lot of dark-colored blood clots ; left auricle and ventricle almost empty. Stomach distended with food.

Case 75.—This animal remained as if in a deep sleep twenty minutes after chloroform was removed. Ten minutes before giving chloroform a hypodermic injection of morphin and atropin had been administered.

Case 78.—Before the animal was placed on the table the temperature was 101.4°; when completely unconscious it was 103.4° on account of the struggling and excitement which had ensued. After being under for twenty-five minutes it went down to 98.8°; taken again twenty minutes later it registered 98°. After one hour the end of the mask was closed, thus preventing entrance of air except such as was mixed with the chloroform vapor. In seven minutes respirations became faint and suddenly ceased, the heart distinctly beating for eight minutes longer.

Post-mortem.—Valves normal. Both right and left ventricles of the heart contained clotted blood. In the trachea and around the larynx and back of pharynx there was a quantity of mucus. The stomach also contained frothy mucus. All these pointed to asphyxia having been the cause of death.

Case 79.—The temperature at commencement was 102°, the animal being placed on abdomen. After the stage of excitement and twenty minutes of anesthesia it rose to 103.8°. Taken again forty-five minutes later the thermometer registered 101°, and twenty minutes after that 99°. The next day the animal was destroyed by the application of one drachm of chloroform on sponge and towel. In two minutes anesthesia was produced; in five minutes respirations ceased, the heart continuing to beat for three minutes longer.

Post-mortem.—Right auricle and right ventricle of heart were full of black blood-clots; left ventricle contained a very small clot. Valves normal.

Case 80.—Whilst under the influence of the chloroform all symptoms of chorea disappeared. Four hours later chloroform

was administered on sponge and towel, 20 minims being used to commence with. Anesthesia was produced in two minutes; one drachm more was added, resulting in cessation of respiration in four minutes, the pulse becoming at the same time imperceptible.

Post-mortem.—On opening the thorax two minutes later the heart was distinctly beating, though spasmodically, and it continued for two minutes.

Case 82.—The next day this animal was again placed under chloroform by means of the anesthetic poured on a towel; anesthesia was produced in one minute, and by adding small quantities when necessary, it was maintained safely for fourteen minutes; at this stage, without any preliminary warning, the respirations became shallow and ceased, the heart distinctly beating for five minutes longer. All efforts to resuscitate were of no avail.

Post-mortem twenty-four hours after. — Heart contained blood-clots in each cavity except the right auricle, which was empty. Valves normal. Lungs showed slight hypostatic congestion, otherwise normal.

Case 83.—Four hours later the animal was apparently all right, and was chloroformed by applying to the nostrils four drachms of anesthetic on sponge and towel. In two minutes unconsciousness ensued, the respiration ceasing suddenly one and a half minutes later.

Post-mortem.—Anthracosis of lung. Heart normal.

Case 85.—The respirations being all that could be desired, the chloroform was intentionally forced in order to cause death, air being excluded. In two minutes respirations became spasmodic and ceased, the heart continuing for two and a half minutes longer.

Post-mortem.—Right auricle full of fluid blood; right ventricle full of clotted blood; left auricle and ventricle each contained a few blood-clots.

Case 86.—Five hours later. While under the chloroform all symptoms of chorea ceased. Chloroform was again administered on sponge and towel, four drachms being applied. In two minutes complete anesthesia was produced, and two minutes later respiration suddenly ceased. The heart-beats could be distinctly felt for five minutes afterwards.

Post-mortem.—Right ventricle contained dark blood; left ventricle empty; valves normal.

Case 87.—Some hours later anesthesia was again produced by towel and sponge method in one minute, four drachms of chloroform being applied at once. Two minutes later respirations suddenly ceased; by the use of amyl nitrite and artificial respiration the breathing was restored. Chloroform was then given by means of an inhaler, anesthesia being successfully maintained for thirty minutes. The chloroform was then intentionally forced, the result being to cause respiration to cease in two minutes, the heart distinctly beating for five minutes longer.

Case 90.—In this case the temperature after placing on the operating table was 102.8°; after being under chloroform for thirty minutes it was 101.8°; fifteen minutes later 100.4°. Five hours later an attempt was made as cautiously as possible to keep the same animal under chloroform by placing the anesthetic on a sponge and towel. In one and a half minutes she was unconscious, half a minute later the respiration suddenly ceased, the heart still beating distinctly. Artificial respiration failed to restore animation, the pulse becoming imperceptible two minutes later.

Post-mortem.—Left ventricle empty; right ventricle full of clotted blood.

Case 92.—The next day, ten minutes after a hypodermic injection of morphin and atropin had been given, an attempt was made to keep this animal under anesthesia by applying two drachms of chloroform to the nostrils on sponge and towel. In one and a half minutes anesthesia was produced, but one minute later respiration suddenly ceased, the heart beating for two minutes after. Vapor of amyl nitrite was forced up the nostrils and artificial respiration resorted to, but without success.

Post-mortem.—Right auricle and ventricle full of black blood-clots; left auricle and ventricle contained a few small blood-clots; valves quite normal.

Case 94.—Four hours after, when apparently completely recovered, the same animal was placed under chloroform by aid of cotton-wool and a towel.

4.09 p. m. Applied to nostrils one and one-half drachms of chloroform on cotton-wool, the towel being folded three times. On account of his activity in getting his head free it took seven minutes and the addition of 12 minims more chloroform to cause complete anesthesia; temperature then 100.8°.

4.18. Added 20 minims of chloroform.

4.24. Added 10 minims more. Temperature 100.6°.

4.32. Added 10 minims more.

4.42. Temperature 99°. Showing signs of recovery, so added 10 minims more.

4.46. Added 5 minims.

4.49. Added 10 minims.

4.52. Temperature 97.6°. Respirations regular and all that could be desired. Added one drachm at once to destroy.

4.54. Added one drachm more.

4.59. Respirations ceased and pulse could not be felt.

Post-mortem —Right auricle and ventricle full of clotted blood: left auricle contained a dark clot; left ventricle empty; valves on both sides excessively thickened. Stomach full of food.

Case 95.—Three days later the animal was destroyed by applying one and one-half drachms of chloroform on wadding and towel.

Ten seconds. Great struggling.

Two and a half minutes. Not completely under. Added one and one-half drachms more.

Four minutes. Respirations spasmodic and gasping, then ceased; heart distinctly beating.

Five minutes. Heart ceased.

Post-mortem, three minutes later revealed the heart still beating regularly but feebly, both auricles and ventricles participating in the movement; valves normal.

Case 96.—Temperature before commencing, 102.1°. The vapor of chloroform was steadily and cautiously given, the animal being completely under at 6.13.

6.24. Temperature 102.8°. Breathing placid and regular.

6.36. Temperature 99°.

6.38. The animal having now been under and in safety for twenty-two minutes, it was destroyed by applying two drachms of chloroform on a four-folded towel to the nostrils.

6.45. Respiration became shallow, faint, and finally ceased. Pulse still distinct at the femoral artery.

6.46. Pulse became very weak, very fast and irregular, and finally ceased.

Post-mortem.—Both auricles and ventricles were full of black clotted blood; valves normal. Stomach contained a small quantity of partly digested food.

Case 98.—12.49 p. m. Chloroform was applied.

12.50. Stage of excitement.

12.51. Anesthesia of hind quarters.

12.52. Complete anesthesia. The animal was kept in safety in this stage for seventeen minutes (four and one-half drachms of chloroform being used), and was then destroyed by the application of one drachm of chloroform on some cotton-wool, air being excluded as much as possible. After respiration had ceased the pulse could be distinctly felt. One minute after respiration had ceased acid hydrocyanic (Scheele, 20 minims,) was sub-cutaneously injected, and artificial respiration commenced, but there was no response.

Post-mortem revealed the presence of a small quantity of dark-colored blood in all the cavities of the heart, in largest amount on the right side. The valves were normal.

Case 100.—The animal was safely anesthetized for twenty minutes, when the air was excluded and chloroform administered in order to cause death. This occurred six minutes later, respiration distinctly ceasing before the heart; the pupils of the eyes were widely dilated.

Post-mortem thirty hours after death.—Each auricle and ventricle contained a small quantity of dark-colored clotted blood. The lungs were much darker in color than normal. Death undoubtedly due to asphyxia.

Case 102.—In this case the stage of excitement was not produced for five minutes, although the chloroform was vigorously applied. On examination of the mask it was found that the felt lining was blocking the entrance of the vapor. This defect was remedied, and in one minute complete anæsthesia was produced. The animal was kept safely in this stage for fifteen minutes, the respirations being placid and regular, as if the animal were asleep. In order to cause death the vapor was then forced into the mask, respiration ceasing about five minutes later.

It will be seen on looking over the foregoing list that the dogs were of all breeds and sizes, of all ages, and in each extreme of bodily health. Some were excessively fat, some very emaciated; two, at least, were pregnant, one of them being the greyhound bitch which was kept under anesthesia for more than three hours, and the other a fox terrier whose eye had to be removed in consequence of an accident, and which was

anesthetized three times. They were fixed on the operating table in various positions, although the abdominal one seems the best. In three cases only were the animals in any way medicinally prepared. The operations, which were very various, were performed intentionally at different intervals after complete anesthesia had been produced; in some cases they were commenced as soon as ever that stage was reached, in other cases not until the animals had been in that stage from five to thirty minutes. Several of the patients were placed under chloroform two or more times. In no case did death occur without a satisfactory reason to account for it. Out of the whole 109 cases only two unintentional deaths occurred, one from careless overdose, the other from foolishly excluding air. With young animals a great deal more care has to be exercised, as respiration ceases very suddenly if the vapor is in any way forced.

With cats, too, great caution has to be used, as the following notes will show.

Experiments on Cats.

Case 1.—Anesthesia was kept up very cautiously, the chloroform being administered at intervals whenever the animal appeared to be recovering. During the last ten minutes respirations became shallow and abdominal. Restoration was assisted by application of amyl nitrite to the nostrils.

Case 2.—Just as the orbit was being cleansed respirations suddenly ceased. The animal held head downwards, after which artificial respiration was tried, amyl nitrite being applied to the nostrils. In about three minutes respirations perceptibly recommenced, and recovery finally resulted.

Case 5.—Respiration was all that could be desired, but, as the operation was unsuccessful in its results, the owner was advised to have the animal destroyed. Chloroform was forced and air excluded, respiration ceased in four minutes. The heart could be distinctly felt to be beating for thirty seconds afterwards.

Post-mortem.—Right side of heart engorged with blood; left side contained a few blood-clots; valves normal.

Case 6.—This time, partly through over-confidence and not being sufficiently cautious, an overdose was given, and respiration ceased very suddenly after seventeen minutes of

anesthesia. All efforts at resuscitation (injection of ether, amyl nitrite and ammonia to nostrils, artificial respiration for fifteen minutes) failed.

Post-mortem.—Both left and right ventricles were almost empty. Lungs full of nodules, each about the size of a millet seed. The presence of these nodules in the lungs, combined with over-confidence and consequent want of care in giving the anesthetic, were the cause of death; no signs of respiratory trouble had been exhibited on the previous four occasions.

Case 13.—The temperature when unconscious was 102.2°; taken twenty-two minutes later the thermometer registered 97.8°; taken again thirty-five minutes after this it registered 95°.

The next day this animal was chloroformed again by applying the anesthetic on cottonwool and towel.

4.4 p. m. Applied twenty minims of chloroform on cottonwool and towel (folded twice) to the nostrils.

One minute ten seconds. Complete anesthesia.

4.6 Ten minims more added.

4.8 Twenty-five minims more added cautiously. Temperature 102.4°.

4.11. Signs of recovery; added 30 minims more.

4.12. Complete anesthesia again.

4.16. Signs of recovery manifested; added thirty minims more. Temperature 101.2°.

4.21. Added twenty minims more.

4.29. Added forty minims more. Temperature 99°.

4.36. Added forty minims more.

4.39. Temperature 98.5°.

4.46. Temperature 97°.

4.50. Added five minims more.

5.1. Temperature 96.6°.

Added ten minims more.

At this stage the animal was breathing well and in a safe condition. This was maintained till 5.15.

5.15. In order to cause death thirty minims were added, air being excluded as much as possible.

5.18. Respirations apparently ceased. Pulse very irregular. Removed chloroform.

5.20. A few spasmodic gasps; heart still distinct.

5.22. Heart ceased. Temperature 95.8°.

Post-mortem five minutes after death. When the thorax was opened the heart was still distinctly beating, the beats being regular, though feeble; valves normal.

Case 15.—When anesthesia was complete the chloroform was intentionally forced in order to watch the result. In two minutes respiration became spasmodic, and it ceased entirely in four minutes. The heart could be felt for thirty seconds longer. Used 3½ drachms of chloroform.

Case 16.—This animal was completely under in one minute, and was kept safely under the influence of the anesthetic for thirty-two minutes; respiration was regular and everything that could be desired, and only two drachms and thirty-five minims of chloroform had been used. In order to cause death one drachm of chloroform was placed on wadding and held to the orifice of the mask. In two minutes respiration apparently ceased, the heart still beating. Two minutes later there were a few involuntary gasps, after which neither respirations nor pulsations could be perceived.

Post-mortem four minutes later.—When the thorax was opened the heart was seen to be beating feebly but regularly, both auricles and ventricles participating in the movement; valves normal.

Case 18.—For cases 18 and 19 I am indebted to Mr. Reeks, college tutor, who administered the anesthetic. This cat was breathing regularly, having been under chloroform for one hour and ten minutes, when Mr. Reeks was called away for a few moments and entrusted the inhaler to a student. On his return he found that respiration had suddenly ceased, and all efforts at recovery were futile.

Case 19 had to be watched very carefully; twice during the hour respirations became shallow, but recovery was eventually made.

The same cat, twenty-four hours afterwards, was chloroformed successfully by applying the anesthetic in small quantities at intervals, and kept under for one hour exactly, using 4½ drachms of chloroform. At the end of that time 2 drachms were suddenly applied over the nostrils, and respirations ceased in five minutes. The heart-beats were distinct for three minutes later.

In the following three feline cases death occurred suddenly and unexpectedly, and the post-mortem revealed the cause in

two instances to be overdose, due to the animal holding its breath and then getting a dose of chloroform vapor when the lungs were already surcharged with carbonic acid gas.

Case 1.—Cat, male, apparently healthy, eight pounds, two ounces weight. Chloroform was carefully administered by means of the inhaler, anesthesia being produced in one and a half minutes. One minute later respiration suddenly ceased, the heart still beating very quickly. Artificial respiration, application of ammonia vapor to the nostrils, and hypodermic injection of ether were resorted to, but without success. The heart continued to beat perceptibly for two minutes longer. Only 16 minims of chloroform had been used.

Post-mortem.—Opening the chest about half an ounce of dark-colored blood was found in its interior, and careful search revealed the ruptured vessel. There were small vegetations on the semilunar valves.

Case 2.—Cat, pregnant, good condition, in labor, for Caesarean section. Chloroform was administered very cautiously, but respirations suddenly ceased in three minutes, and all efforts to restore animation were futile. Artificial respiration was continued for seven minutes, ether being hypodermically injected, and amyl nitrite held to the nose. The operation was performed successfully, a living kitten being removed. Only 30 minims of chloroform had been used.

Post-mortem revealed the cause of death to be rupture of the portal vein ; there was a quantity of blood in the abdominal cavity, and distinct rupture of the liver substance. The kidneys and liver were in a state of fatty degeneration. The rupture was probably caused by the struggling which ensued when inhaler was first applied.

Case 3.—Cat, male, twelve months, healthy, weight seven and one-half pounds. Chloroform was cautiously administered by the inhaler, causing anesthesia in three minutes; three minutes later the animal held its breath and respirations ceased suddenly, the pulse becoming imperceptible at the same time. Artificial respiration and restoratives were of no avail. Only 32 minims of chloroform had been used.

Post-mortem, some hours later, revealed all the internal organs to be perfectly healthy.

From a study of the foregoing observations it may be concluded: That chloroform may be administered with safety to a

healthy dog if proper precautions be taken, especially with regard to the method of restraint used and the manner in which the anesthetic is given. The less an animal is allowed to struggle the better, and care must always be taken that nothing is allowed to interfere with the free performance of respiration. For the cat chloroform is not so safe, and much greater caution has to be used in its administration. Young animals are more susceptible than adult or old ones. When any respiratory trouble is present the risk is greatly increased; when cardiac trouble is present it is always well, too, to be more cautious, although the post-mortem of some of the animals which bore the chloroform splendidly revealed extensive valvular vegetations.

In administering the vapor it is always safer to proceed slowly, and allow from five to ten minutes to produce complete anesthesia, rather than throw a large amount of concentrated vapor into the system at once. Effort should be made to only allow just sufficient chloroform vapor to produce anesthesia to be present in the air inspired. By this means the stage of excitement is minimized and the stage of anesthesia prolonged in the safest possible way. The advantage of an inhaler, by which the amount can be regulated, over the sponge and towel in order to attain this end, is too obvious to need comment.

In order to insure success the anesthetist should attend to the chloroform alone, and not be observing the operator. The respiration must be very closely watched, and on the first signs of shallow or spasmodic breathing the antidotal measures should be resorted to.

Of these, artificial respiration, plenty of fresh air, cold affusions to the face, air pumped up the nostrils, inhalations of amyl nitrite or ammonia, or hypodermic injections of ether are the best. Hope should not be given up for fully ten minutes after the animal has become apparently dead.

In the cat it is always a very bad sign when the hair on the back turns the wrong way after the respiration has ceased.

Death occurs from respiratory arrest. In every one of the foregoing observations in which the heart and respirations appeared to cease together, or in which the heart appeared to cease first, if the thorax was opened within one or two minutes afterwards the heart was found to be beating.

The effect of chloroform upon the temperature of the body is to cause it to become subnormal, particularly when the anesthesia is prolonged. The rise at the commencement is due solely to the enforced activity and exercise produced by the efforts to resist restraint; this I have proved by a number of experiments. In our patients the contraction of the pupil, which precedes the dilatation, is not always seen, as dilatation usually takes place very rapidly.

MALLEIN.

ITS DIAGNOSTIC VALUE. REGULATIONS FOR ITS EMPLOYMENT.

By E. Leclainche,*
Professor at the Veterinary School of Toulouse.

The discovery of the diagnostic properties of mallein has completely altered the question of the diagnosis of glanders. The frequent difficulty of detecting any signs by clinical examination and the complexity and imperfection of the experimental procedures employed in confirming a diagnosis have justified its value and the anticipation with which this new method has been received.

The exhibitions of mallein in the diagnosis of glanders are today numbered by thousands, and some of these observations have been published. No more numerous and conclusive observations could have been made, but still mallein today meets some determined adversaries. The numerous questions which the use of mallein has raised may perhaps not be completely solved, but there are at least some points definitely determined, upon which there is unanimous accord. It is our object, outside of all dogmatic discussion, to present the essential facts and to show their application in the following discourse:

I. Value of Mallein.

Mallein is today prepared in numerous laboratories and according to very different methods. The effects of the diverse malleins obtained have been far from identical, and the results

Rev. Vet.

which have been obtained cannot be accurately compared. The following arguments are based upon the mallein of Roux, used only in France.

The knowledge relative to the preparation of mallein and the technique of inoculation are today classical. It is needless to repeat them here; it is only the facts relative to the diagnostic value of mallein that will be discussed.

The diagnostic properties of mallein are not contested; it is admitted unanimously that the reaction is observed even when the lesions are very recent and very limited.

The theoretical value of this reagent being known, one question at once presents itself: Are the indications furnished by mallein so accurate and constant that their significance is unequivocal and certain? To what extent is the method practically applicable?

The objections made against the employment of mallein may be classified under two groups:

1. The reaction consecutive to an injection of mallein is true in its expression; it may, perhaps, be difficult or impossible to interpret the signification.

2. The reaction is not of absolute diagnostic value; it is observed in non-glandered horses; it may perhaps fail in glandered horses:

(*A*) Mallein produces in a glandered horse an elevation of temperature (*thermic reaction*), general symptoms (*organic reaction*), and a tumefaction of the point of inoculation (*local reaction*).

The *thermic reaction* consists of an elevation of the internal temperature, which attains 1½ to 2½° and more, above the normal. Already noticeable toward the eighth hour after the injection, it reaches its maximum limit toward the twelfth hour and exceptionally the fifteenth to the eighteenth hour. It is important to recall that the hyperthermia thus acquired persists during twenty-four hours at least, the temperature is lowered gradually, and slowly decreases until it attains the normal.

The *organic reaction* is indicated some hours after the injection by dullness, increased respiration, chills and muscular tremblings. After ten or twelve hours the animal is in a state of intense prostration; he remains immobile, with the head low and one of the members resting; the physiognomy is anxious; the mucous membranes injected; the appetite is suppressed and

much diminished; at times slight colicky pain, or diffuse swelling of the members is seen. Walking is slow and painful; the members are raised with difficulty. The symptoms observed simulate those which characterize a typhoid state.

The *local reaction* consists in the development of an edematous tumor at the point of inoculation; the tumefaction appears some hours after injection; hot, tense and painful, it presents the characters of an inflammatory edema. It is irregularly round and its extent reaches the diameter of the palm of the hand and even may be larger.

At times, corded lymphatics extend from the swelling to the neighboring lymphatic glands. The tumefaction increases during twenty-four hours. It remains stationary during two to three days, to be absorbed slowly in from five to eight days. The co-existence of a persistent hyperthermia of 1½° and more, and a complete and equally durable organic reaction constitute an unequivocal diagnostic condition. The signification of the local reaction is much less absolute; if it is never completely absent in glandered horses, its extent and its evolution are very variable;* besides, healthy animals show in the region inoculated an edema which, though ordinarily insignificant, acquires in certain cases a development equal to that which is found in some glandered horses.

In the immense majority of cases the indications furnished by mallein must be accepted as unmistakable evidence. If the horse is not affected, he preserves his gait and external peculiarity; if he is, he offers such evident manifestations that eight or ten hours after the injection the diagnosis can be made even at a distance by a simple glance with the eye upon the animal.

In some animals only is the reaction doubtful and insufficient to permit a diagnosis. The hyperthermia here is between one and one and a half degrees; the signs which express the organic reaction are attenuated in various degrees. The subjects which present this incomplete reaction should not be at once condemned, but should be at least suspected, and mallein renders this distinct service of detecting suspects which otherwise would not be recognized.

* It is upon this point, in our mind of quite secondary importance, that the observations are most at variance. Some consider the local reaction as constant and typical, while others deny it any significance. The results obtained evidently vary according to the experimenter himself and to some detail in the technique apparently insignificant. It is necessary to take into consideration the exact seat of the inoculation as well as its depth.

The first objection to mallein must therefore in part be admitted; the method is not resolved into a simple question of temperature; one does not depend upon the temperature as to whether an animal is glandered or healthy. The indications furnished by mallein should therefore be carefully studied, determined and interpreted.

(*B*) The most powerful objections are made against the employment of mallein. The reaction may be inaccurate in two ways: it may be observed in horses that are healthy; it may be wanting in glandered horses.

A first series of accurate observations show that *at times* an injection of mallein may produce a hyperthermia which attains 1½° in horses affected with melanosis, strangles, chronic pneumonia, pulmonary emphysema. An analysis of these same facts shows that in these cases the phenomena have peculiar characteristics and are quite different from the complete reaction of glanders. The increase in the temperature follows rapidly; it only persists for some hours; the organic reaction is little or not at all marked. In these cases an error can always be avoided; a simple suspicion is even only exceptionally justifiable.

Some experimenters have also endeavored to demonstrate the presence of a symptomatic reaction in animals free from glanders. It would be useless to refute all these statements, and for this reason alone, that they are contrary to the rule, and one should not deny that the accurate observations published upon this point are very few. These unfounded affirmations constitute neither a proof nor a presumption, and a number of allegations have been made which are negatived under the least critical examination. In several of these reports many defects in the technique have been shown; in the majority of cases the evidence is not sufficiently clear that the animals having reacted were free from glanders.

It would be easy to uphold the absolute specific character of the reaction and the accuracy of the method by recalling on one hand, the extreme insusceptibility to the mallein of the animal not showing the insignificant initial lesions, and on the other, the difficulty of detecting the latter at the autopsy by the most careful examination. It is practically necessary and more just to accept integrally the conclusions against mallein in some cases in which they are determined with an impartial motive.

One can admit that mallein is capable of provoking a complete reaction in healthy horses, but we should at once affirm that this deceptive reaction is *extremely rare.*

A second objection, more grave than the preceding, has also been charged to this method : may the reaction be wanting in glandered horses ? No proof has been furnished upon this point. On the contrary, the indications furnished by mallein have been found exact in all cases submitted to control. The method is thus shown to be superior, not only to a clinical diagnosis, but also to certain modes of experimental determination. Ulcers of the pituitary mucous membrane, corded lymphatics of the members, etc., have been accurately and rapidly differentiated. It is even remarkable that mallein in affected animals has shown itself much more reliable than tuberculin in analogous conditions.

If an injection of mallein does not produce any reaction, it may be affirmed that an animal submitted to this test is not glandered, whatever may be the appearance of the symptoms observed.

En résumé, an animal which in consequence of an injection of mallein presents a complete reaction—hyperthermia of 1½°, at least, and evident organic reaction—should be considered *glandered.*

Animals which present an incomplete reaction should be considered as *suspects.*

Animals which do not show any reaction should not be considered glandered.

II. Employment of Mallein.

I. The superiorty of mallein over all other methods of diagnosis is very evident. In animals suspected of glanders in consequence of some certain symptoms, a diagnosis can often be made without any difficulty.

It is useless to insist upon the uncertainty of a clinical diagnosis and many practitioners can testify to errors made on this point. Without doubt these errors varied with the ability of the clinician, but the "clinical tact" of the most able will inevitably lead to mistakes.

The experimental methods of diagnosis have rendered, and do still render, valuable service under certain conditions. The inoculation of susceptible animals requires a proof which it is

sometimes difficult to obtain, and the virulency of the matter inoculated is not always constant. The nasal discharge, most ordinarily employed, may lead to false results from the presence of foreign microbes capable of producing suppurative inflammation and even the death of the subject; besides, its virulence is variable and uncertain. Frequently it is difficult to procure susceptible animals for inoculation. The ass is too expensive; the dog is inoculated with difficulty; the cat is little manageable; the guinea-pig may die too early during the disease. Errors are always possible. All those who have experimented with inoculations have seen that the most susceptible animals, the ass and the guinea-pig, resist the inoculation of the nasal discharge of glanders; besides, the reputed characteristic reaction, such as is obtained from intraperitoneal inoculation in the guinea-pig, is obtained with products that are not glanderous (Nocard, Kutscher.) Thus, the inoculation does not in all cases give positive indications; it liberates horses that are glandered and condemns some that are not glandered. Direct experiments with the bacillus and cultures present undeniable advantages as well as evident disadvantages. These procedures are not employed in general practice. Mallein shows itself not only equal or superior to the other methods in making a diagnosis of clinical suspects, but it also possesses the advantage of detecting the disease in the absence of all visible symptoms. The latent form of glanders, which all observers properly consider as a great obstacle in the prophylactic treatment of the disease, are recognized with absolute certainty. Recent visceral lesions, chronic latent alterations are revealed in the absence of any appreciable manisfestation when all the other modes of diagnosis are powerless.

As to the utilization of mallein, one may distinguish *an inoculation of choice* and *an inoculation of necessity*. The first may be employed in animals clinically suspected with the purpose of confirming the diagnosis. Being simple and economic it sufficiently recommends itself to the practitioner by the certainty and the rapidity of its indications.

The second should necessarily be employed in all animals suspected of contamination. This constitutes the basis of the prophylaxis of glanders. It is upon these data that the employment of mallein should be regulated and its use in this respect should be in accordance with proper sanitary and economic

legislation. Concerning *animals clinically suspected*, mallein should be recommended as the simplest means of establishing the diagnosis under the following conditions :

1. All animals which present a complete reaction are considered glandered and should be destroyed.

2. All animals which present an incomplete reaction should be considered suspected and submitted to the quarantine prescribed by articles forty-six and forty-four of the law of 1881. After a period of two months they are submitted to a second inoculation, if in the mean time glanders has not been recognized by any other method of diagnosis,

3. All animals which present no reaction are considered free from glanders.

Special supervision should be given to animals suspected of contamination, that is to say, to those which, having been exposed to the infection, do not present any acute signs of the disease. It is known today that in an infected medium the transmission of glanders takes place with much greater frequency than has formerly been supposed. It is also known that the infection ordinarily takes place through the digestive tract, the first stages of the evolution of the disease and the pulmonary infection subsequently remaining unnoticed. Finally, it is known that a large number of animals successfully resist an invasion by the bacillus and that complete recovery is possible.

Theoretically, perhaps, it would be indicated to sacrifice without delay all animals exposed to infection which present a complete reaction. A strict application of the stamping-out process of glanders would certainly have as its consequence the immediate eradication of the disease. The wholesale slaughtering would only be rarely necessary. The infection of large collections of animals would thus be avoided and a special supervision should be reserved to animals congregated in large numbers.

Such a procedure would nevertheless be applicable only on condition of a large indemnity to the owner. It would also necessitate a thorough sanitary organization.

Experience, however, seems to demonstrate that such a sacrifice is not indispensable. If animals exposed to contagion be submitted to the action of mallein, it is found that a certain number of them, healthy in appearance, give the char-

acteristic reaction. The proportion is variable, according to the length and permanency of the affection as well as the condition of the animal and the work he does. If, instead of killing horses which have reacted to mallein, they are merely isolated and removed from all new contagion, there is only a small number that will subsequently present clinical signs of the disease. If these isolated animals be periodically subjected to successive injections of mallein, it is found that the number which react will diminish at each test, in such a manner that subjects condemned on one or two inoculations are indicated to be healthy at subsequent injections. These proofs have attracted the attention of the Consulting Committee on Instruction of the epizootics of 1894, and later were adopted the procedures followed in the army, such as are prescribed by the law of September 20, 1895. It may be of interest, nevertheless, to allow a month or two to intervene between the successive inoculations. One should also not kill animals that have given a complete initial reaction until after two subsequent successive reactions equally complete; and not after the second. These modifications are justified by numerous observations, showing that animals which at intervals of a month have reacted completely two or even three times have not reacted subsequently and can therefore be placed in the service without any inconvenience. The regulations applicable for this purpose may be formulated as follows :

(*a*) Animals exposed to the contagion and which have reacted completely to mallein should be individually isolated. Those which present any of the clinical signs of glanders (enlarged gland, discharge, epistaxis, lymphangitis, sarcocele, nasal or cutaneous ulceration) should be destroyed at once. The others are submitted at intervals of two months to injections of mallein. After two consecutive but complete reactions they should be destroyed.

(*b*) Animals exposed to the contagion but showing an incomplete reaction, and those which, having reacted completely, give subsequently only an incomplete reaction, should be isolated and submitted to new injections every two months. They are destroyed if they give two complete successive reactions or also if after having given a complete reaction they present some one of the clinical signs of glanders. They are liberated if they do not react to two successive inoculations.

It does not enter into the object of this paper to study the role of mallein in the prevention of glanders. This new method enables us to prevent the most frequent mode of contagion, that is, the introduction into a stable of an infected animal. In all cases in which animals are repeatedly exposed it is indicated to submit to the proof all animals introduced. In cavalry horses it is indispensable to have recourse to inoculation. When animals enter the remount depots or when a new corps arrives numerous examples could be cited to demonstrate the excellence and the necessity of such precautions. A general prophylactic measure relative to sanitary police, pertains to the examination of imported horses in the same manner as cattle must be submitted to the tuberculin test. The mallein test should also be made obligatory for horses that are imported. This measure would seem to be so much more justified as the disease is more widespread in the importing countries. In Hungary from 700 to 800 cases are found yearly. In Great Britain 1500 to 2000, but the statistics are very incomplete. Finally, in the United States, which exports a large number of horses to our country glanders exists nearly everywhere. (?)

Mallein has furnished sanitary police with facts of such gravity that its usage should be strictly enforced. There would be certain advantages to place the mallein in charge of the chief of the sanitary service in each department. He would distribute gratuitously the agent in doses to veterinarians who apply. The latter should furnish, at their request, sufficient knowledge of the identity of the animals to be tested; they should also return within a stated time results of their examination. Such regulations are not without inconveniences.

A serious obstacle to all restrictive measures consists in this, that mallein has found its way into commerce in the various States and like many other commercial products its quality is susceptible of variation. The preceding considerations seem to justify the following conclusion:

1. The test with mallein constitutes a means of diagnosis which responds to all requirements.

2. All animals clinically suspected or simply contaminated should be submitted to this test according to the rules adopted in the army by the law of September 20th, 1893.

3. All solipeds imported from the frontier or through seaports should be submitted to the mallein test.

THE VALUABLE FACTS IN THE COURSE OF DISTURBANCES OF LOCOMOTION AND SENSATION IN CONSEQUENCE OF CEREBRAL CONCUSSION AND CONTUSION IN SOLIPEDS.*

By S. Arloing.

Physicians have very carefully studied shock and concussion of the brain in consequence of falls upon the head or from a great height with a direct or indirect action upon the skull; and injuries from projectiles are unfortunately very frequent in man. These accidents being less common in our large domestic animals, veterinarians have described these incidents less frequently. I suppose that to practitioners who are interested in a knowledge of the pathology upon this point it would not be uninteresting to speak of two observations, one relative to a case of concussion, the other a case of cerebral contusion, although these may in some respects be somewhat incomplete. According to the traditions of the principles of surgery since the seventeenth century, I will designate by the term *cerebral concussion* a shock of the nerve tissue not followed by laceration and hemorrhage. I will reserve the name of *contusion* to concussion accompanied by vascular disturbance, resulting in cortical or deep hemorrhage.

Observation 1 pertains to a case of cerebral concussion and observation 2 to cerebral contusion, but I must add that if this distinction is possible at the moment of necropsy it is not so during the life of the patient, that is to say, from the symptoms.

Observation I.—During a charge of cavalry the mounts of two hussars injured themselves by running against each other head to head. Both horses and riders fell, one of the horses, the one in question in this observation, remaining prostrate upon the ground. The other animal, on the contrary, quickly arose without any serious lesion, whilst his rider, unconscious, was taken to the hospital where he died at the end of several hours. The horse placed upon an ambulance was taken to the infirmary where, during several hours, frequent and abundant applications of cold water were applied to the head. His condition

**Jour. Vét. Méd.*, October, 1896.

gradually ameliorated and very soon he was able to get up and eat, but he carried the head low, the eyes half closed and tumefied as if suffering from conjunctivitis. The animal was kept for two months, and at the end of this time, his recovery seeming impossible, he was destroyed.

Thanks to the courtesy of one of our military confrères, I was permitted to study the patient about a month after the accident and to examine his brain subsequently.

Clinical Examination.—The general state of the horse was satisfactory; at rest, the attitude of the members was normal but the head was constantly held low; nevertheless the subject in the stall seemed more immobile and more listless than his companions. When the animal was made to walk, the abnormal conditions of the head and the members could at once be seen. The head instead of being carried in a straight line with the body was pivoted at the poll so as to carry the latter to the left and the nose to the right and was constantly maintained in this position: the posterior members were separated so as to enlarge the base of support; they were raised with hesitation but at times very suddenly and not in proportion with the effort to be overcome, in such a manner that it seemed as if at each instant he would fall upon the side opposite to the member raised. The anterior members showed the same irregularity in being raised and placed upon the ground. If the animal was made to trot, in addition to the preceding troubles, the entire trunk was incurvated towards the left which carried the entire body toward the corresponding side. The twisting of the head upon the neck could be produced by exciting the animal even when at rest. The superior lip was slightly deviated to the right. En résumé, irregularity and incoördination of movements of the members, twisting of the trunk and of the head to the left, and inability to walk in a straight line, were the locomotory troubles observed in this horse.

On examination for sensibility there was a slight cutaneous anesthesia above the superior commissure of the left nostril. In all other parts the skin was very sensitive. The animal could suddenly throw the head to the left side to chase flies alighting upon the shoulder and thorax. On the contrary, when the same movements were attempted on the left side, the head and neck described a very large circle and he could only reach the posterior right member with the end of the nose.

Sight was lost in both eyes. The right eye was movable by all of its muscles, but was almost constantly pulled upward and outward. The cornea, which was slightly opalescent, showed an opacity upon the superior part of its contour. Pupil was somewhat dilated but normal; the left eye appeared as if amaurotic, the cornea transparent, the pupil extremely dilated and the movements normal. The tongue was sensitive over its entire surface, perfectly mobile and not excoriated. Hearing was preserved although feeble on the left side. Pressure upon the top of the head at the level of the temporal fossa and below the base of the ear produced evident signs of pain; there appeared to be no trophic trouble, although the excoriated surfaces resulting from the accident seemed to heal with great slowness; besides the epidermis was cracked upon the superior lip close to the left commissure.

Necropsy.—The examination of the brain made seventy-five days after the accident has not furnished any positive information. It was made too late, and was almost negative. In fact, no apparent lesions could be seen in the lateral ventricles, in the interior of the cerebral hemispheres, on the surface of the cerebellum, or in the medulla. On the surface of the right cerebral hemisphere, and notably at the level of the principal divisions of the artery of Sylvius, some convolutions along the limits of the frontal lobe, the curved plate, as well as in the zone of the sigmoid gyrus, and upon the superior face of the parietal lobe to its posterior extremity only colored patches could be seen where in consequence of the excessive congestion and the strong concussion were destroyed some blood globules and a portion of the nerve elements. These alterations are indicated in a doubtful manner, because no histological examination has been made. It is impossible to prove if there were immediately after the accident true hemorrhage and bloody infiltration.

Observation 2.—This case was an ass, and the history was very imperfect. This subject was among a lot of animals brought to the Veterinary School for practical exercises. The first thing that attracted one's attention was the uncertainty of his gait, and we decided to make a careful examination.

Clinical Examination—At rest the animal was stupid; he carried his head low, but in the axis of the trunk and often rested it on the manger; when the animal walked the members were moved with difficulty; the members were raised with

hesitation, but when this was accomplished they passed beyond the physiological limits so that at each step the centre of gravity seemed to be displaced outside of the base of support.

When left at liberty he turned in a circle with an incurvation of the trunk to the right and a twisting of the head upon the neck in such a manner as to place the left side of the face in a semi-horizontal direction.

If the head is forcibly held so as to make him walk in a straight line falling becomes imminent.

There was no evident paralysis.

Sight appeared preserved in the left eye; in all cases the eyes were of normal appearance. The animal having been sacrificed immediately after this examination, the brain was carefully examined.

Necropsy.—After its removal the brain was placed in alcohol for twenty-four hours, in order to make it firmer and easier of manipulation. The envelopes having been removed, nothing could be seen on the surface of the right hemisphere; the left hemisphere, on the contrary, presented several reddish-brown hemorrhagic centres, at the level of which the cerebral cortex offered a greater consistency:

First, a spot two millimetres in diameter toward the posterior third of the convolution of the corpus callosum and close to the superior border.

Second, a small spot and a larger one, the latter having about the diameter of a centimetre upon the posterior fold of the convolution which we compare to the curved plait of man.

Third, another spot, larger and occupying one-half of the fold which borders, behind, the median branch of the fissure of Sylvius. The hemorrhagic infiltration has been more abundant, and has penetrated more deeply into the cortex at the superior part than at the inferior part of the spot.

Fourth, a hemorrhage, less extensive than the preceding, upon the third inflexion of the convolution analogous to the ascending frontal in man.

Five hemorrhagic spots were distributed upon the superior face of the cerebellum. At three of these points the blood had penetrated quite deeply into the nerve tissue. There was also noticed a hemorrhage into the thickness of the right *tubercular testis* extending to the surface; the left *tubercular natis* is larger than the right; the *conarium* is infiltrated with blood; it seemed

transformed into a hemorrhagic centre which extended for a centimetre upon the anterior longitudinal tracts of this appendage.

The *cerebral choroid plexus* is granular, pale gray, and bloodless on the right side; on the left side its vessels are voluminous and gorged with blood.

The *striated bodies* on the left side are enlarged, and their surface is traversed by blood vessels more visible than ordinarily; on the right side it is normal in dimension and vascularity.

On making a longitudinal section it is found that the enlargement of the corpus striatum on the left is due to a hemorrhagic nucleus prolonged backwards to the nates. Outside of the preceding region, numerous infarcts are found in the liver, spleen and the supra-renal capsules. The surface of the spleen is bossellated, some infarcts having the volume of an apple to a small orange.

The infarcts occupy the cortical substance of the supra-renal capsules, the liver; they also contain a semi-fluid blood. Although there is no positive information as to the history of this subject, we do not hesitate to attribute the above anatomical and physiological conditions to a violent commotion (fall or shock) which has simultaneously produced rupture of the cerebral blood vessels (contusion of the brain), and in the parenchymatous viscera of the abdomen. As to the date of the accident, we cannot express ourselves, but we do not believe that it has been of long standing. In fact the alterations of the extravasated blood in the gray cortex of the cerebrum and the cerebellum or in the depth of the striated body have not advanced far.

En résumé, here are two subjects upon which, in the absence of any history, encephalic lesions may have been diagnosed because the stupid attitude at rest, the incoordination of the movements of the members, the twisting of the head, the incurvation of the trunk, and the tendency to turn in a circle while walking are characteristic of these lesions.

But these physiologic symptoms manifest themselves in a general manner without any precision as to their exact nature; although they are similar in the two subjects, they are caused by a simple concussion in the one and by a cerebral contusion in the other.

This does not signify, however, that the relations between the symptoms and the lesions in the two cases were identical. In the first observation, the colored area was situated on the right side and the animal turned in a circle on the same side; in the second observation, the hemorrhagic spots were found on the left side and the animal turned toward the right. It must be added that in the latter case the hemorrhagic foci occupied several regions of the cerebellum and the thickness of the optic and striated bodies.

Could one not explain these differences by saying that in the ass the lesions have determined an inhibition of the corresponding zones of the other hemisphere, or some dynamo-genetic phenomena in the opposite side of the spinal cord, while in the horse the cerebral accidents have caused the ordinary lesions of the cortex, that is to say, a diminution of the contractility in the muscles of the opposite side of the trunk, having as its consequence, the incurvation of the vertebral column on the side of the lesion?

One can judge from these two instances the difficulty of making a precise diagnosis in such analogous cases.

Nevertheless, the distinction between concussion and contusion of the brain being placed to one side, if there is only alteration in locomotion the accident should be especially related to the motor regions of the cerebrum and cerebellum; if the locomotory troubles are accompanied by alterations in sensation, it may be relegated to the posterior regions of the hemispheres, or some points in the gray nucleus of the base of the brain or the medulla. The tendency to turn in a circle does not absolutely indicate the presence of cerebellar lesions.

ABSTRACTS.

FORMIC ALDEHYDE IN OPHTHALMIA.

Stephenson employs with success a 1-2000 solution against purulent ophthalmia. McKenzie Davidson prescribes a 1-3000 solution against infected wounds of the cornea, with consecutive hypopyon. It is applied hourly.—*Jour. de Méd. Vét.*, October, 1896.

DERMATOL IN DIARRHEA.

Prietsch prescribes dermatol against diarrhea in the dog, 8–12 grains given in sugar; for the calf and the pig 6 to 15 grains two or three times daily.—*Jour. de Méd. Vét.*, October, 1896.

DRENCHING THE PIG.

Claussen for this purpose employs an old shoe with a hole cut in the toe. The shoe is forcibly introduced into the mouth of the pig, which ceases to squeal, commences to chew the leather and quietly swallows the liquid that is poured into the shoe. The procedure is original and may be useful in swine practice.—*Jour. de Méd. Vét.*, October, 1896.

CRIBBING CURED IN A HORSE.

Maleef reports a cribber which, falling upon an obstacle, suffered from dislocation of the fourth cervical vertebra. It was impossible for the animal to get up. Traction upon the neck, and strong pressure at the level of the fourth vertebra, effected a reduction of the luxation. The reduction being effected, the animal gradually recovered, but never again cribbed. The author supposes that these happy results are due to the altered function of the pneumogastric and sympathetic.—*Recueil de Med. Vet.*, July, 1896.

RHINO-LARYNGOSCOPY.

The diagnosis of the diverse affections of the nasal cavities, pharynx and larynx by an ordinary examination is very difficult in a large animal. Cadiot devises instruments with which

the depth of these cavities can be examined. They consist of panelectroscope of Leiter, with a reflected light, as is employed with the rhinoscopic tubes of Polanski and Schindelka, and the rhino-laryngoscope of Leiter, with internal light. The manner of using the rhinoscope is simple and is of great advantage in the examination of these parts.

TREATMENT OF CONTRACTION OF THE HOOF.

Waldteufel, a military veterinarian, believes that contraction of the foot, contrary to what is generally admitted to-day, has for its principal cause the drying of the horn, the atrophy of the frog being secondary. His treatment is based upon facilitating the natural movements of the hoof and preventing the drying of the horn. He opens the lateral lacunae of the frog by thinning the bars as far back as the heels; the sole of the hoof is covered with tar and oakum and a leather pad. This dressing is renewed monthly.—*Rev. Vét.*, October, 1896.

EXTERNAL FORM OF THE HORSE'S HOOF.

Authors are very much at variance as to the angle of the hoof at the toe in profile, as well as the relative height of the toe and the heel.

Loubeyre measured the hoof of an Arabian horse which worked daily to a vehicle, but had not been shod from the age of two to five years.

The angle formed by the toe with the ground surface in profile was 52°, and not 45°, as is generally admitted.

The height of the heel was .625 of the length of the toe, or almost two-thirds of the length of the latter.

The length of the toe was 3.5 inches, and the width at the mamma 4.1 inches.—*Rev. Vét.*, October, 1896.

ACUTE MUSCULAR RHEUMATISM CONSECUTIVE TO INFECTIOUS PNEUMONIA.

Schwendimenn has observed this affection in a horse convalescing from pneumonia. The rheumatism, accompanied by fever, inappetency, and difficulty in locomotion, first affected the dorsal and psoas muscles, then those of the poll, neck and elbow with the classical symptoms of myositis.

Treatment: Chloroform liniment and bathing with a solution of chloral. Recovery in fifteen days.

In 1894, a similar case was observed by Lachmann in a horse four years old recovering from pneumonia. The myositis commenced in the posterior members, and two days afterward suddenly appeared in the anterior members, especially in the muscles of the arm and the forearm.—*Jour. de Méd Vét.*, October, 1896.

RARE PATHOLOGICAL CASES FOUND IN MEAT INSPECTIONS.

Large cysticercus in a bronchial gland in a bull.

Peptic ulcerations in the rennet of a cow and in a twelve-weeks-old calf.

Tuberculosis of the eye, especially of the iris, cow four years old.

Tuberculosis of the vaginal sheath in a bull, with normal testicle and cord.

Double tubercular orchitis in a boar.

Actinomycotic liver in the ox weighing 106 pounds.

Cranial tuberculosis (occipital, parietal and horn cores) with tubercular meningitis in a heifer two years old.

Fatty degeneration of the ovaries with complete atrophy of the uterus in a cow having the external appearance of an ox.

Tuberculosis of the lungs, liver and mammæ in a goat suckled by a tuberculous mother.—*Jour. de Méd. Vét.*, October, 1896.

DURATION OF THE FECUNDITY OF STALLIONS.

Grabensee has collected from the Prussian studs some statistics relative to the age to which stallions can be employed to advantage for breeding purposes. In these studs the fecundity was in many cases prolonged for a long time, and the most remarkable instances of this kind were seen in the stud at Hanover. From accurate records it is shown that since 1822 129 stallions were in service for twenty years or over. Of these 129, four were in service for twenty-six years, six for twenty-five, four for twenty-four, sixteen for twenty-three, twenty-one for twenty-two, thirty-three for twenty-one, and forty-five for

twenty years. Commencing service at the age of four years, the four that were in service for twenty-six years remained in the stud for thirty years.

One stallion in his twenty-seventh year served with full success sixty-seven mares, and during his entire career 1900 mares. —*Annales de Méd. Vét.*, November, 1896.

IMPREGNATION OF MARES AND COWS.

Gast has employed a means for the purpose of impregnating mares and cows which has been successful for four years. He has experimented upon thirteen cows and eight mares, with complete success. Among these was an aged mare which had taken the stallion twice without result, but became pregnant with the means adopted below. Another had aborted at four years, and to-day, at seven years, has given birth to three foals.

About an hour before service the following solution is injected into the vagina of the mare and cow: Five grams of bicarbonate of soda to about a litre of water, injected with a syringe.

This solution completely neutralizes the vaginal secretions, which are acid and destroy the vitality of the spermatozoa; besides, it quiets the ardor of the female without making her indifferent.

Other veterinarians have employed this procedure with, it is said, the best results. Dilation of the os uteri may be practiced at the same time.—*Annales de Méd. Vét.*, November, 1896.

EXPERIMENTAL RESEARCHES UPON THE INOCULABILITY OF CANCER.

Gratia and Liénaux published a report of a certain number of experiments on the transmission of cancer from man to dog and dog to man. These trials, somewhat varied, were uniformly negative. Gratia and Liénaux conclude that the demonstration of the parasitic nature is not established and the contagiousness of cancer, directly or indirectly, is not proved. That at most one can only admit the possibility of cancer grafting; and this only upon subjects exceptionally predisposed.

Since that time nothing has occurred to change the opinion of the authors; on the contrary, more recent experiments confirm the preceding. Alveolar cancer of the mammary gland of

a bitch was used in making subcutaneous transplantations, and injections upon white and gray rats. These experiments were uniformly negative.—*Ann. de Méd. Vét.*, October, 1896.

A PECULIARITY OF THE TECHNIQUE OF LOCAL ANESTHESIA WITH COCAIN.

At the second Medical Congress at San Remo, in April last, Costa said that local anesthesia with cocain, such as is ordinarily practiced, has two defective points: first, it is necessary to employ large doses of the alkaloid when operating over a large area, hence danger of intoxication; second, a certain period of time must elapse from the moment of the injection to the commencement of the operation. In order to overcome these inconveniences, Costa has employed the solution of cocain at a temperature of from 50° to 55°. From this practice result, according to him, the following advantages: This solution of 4-10 to 5-10 per cent has a superior anesthetic power; the local anesthesia manifests itself immediately after the injection. With equal quantities of the cocain solutions injected the zone of insensibility that is produced is greater when the solution is warm than when it is cold.

By employing a more dilute solution, which nevertheless acts upon a larger area, the toxic effects of cocain are diminished. The verification of Costa's statements are worthy of consideration.—*Journal de Méd. Vét.*, September, 1896.

COLORATION OF THE HOOF.

Bouley has established the principle that the horn always has the color of the integument which generates it. Delprier draws the following conclusions: first, that the podophyllous tissue is generally deprived of pigment, and that consequently the keraphyllous laminae are always white; second, that the color of the coronary band is always like that of the skin above it; third, the color of the sole shares that of the wall and becomes lighter from the internal to the external face. These principles, formulated by Bouley, are accurate, but the three other assertions are not well founded.

The podophyllous tissue is often pigmented and the keraphyllous is always colored like the coronary region to which it corresponds. The coronary band often has shades very different

from the color of the terminal skin; they may be colored otherwise than the wall, and the diverse shades of the sole persist throughout its entire thickness. Finally, the coloration of the podophyllous tissue is often different from the keraphyllous tissue which covers it, a demonstration that these laminae of horn are not secreted by the podophyllous membrane.—*Soc. Cent.* June, 1896.

THE CZAR'S BLUE-EYED HORSES.

The Emperor of Russia has four separate "services" of horses and carriages—the gala set and the French, English and Russian set. Each set comprises at least fifty horses. The Russian set accompanies the Emperor wherever he goes, and at Gatchina it is used, together with the English set. The gala and French horses and carriages are housed at St. Petersburg, in the Winter Palace stables.

The Emperor's gala turnout consists of fifty Hanoverian horses. The horses are perfectly white, with blue eyes, and anything more magnificent in the way of trappings than their harness can hardly be conceived.

The state carriages are of the Louis XV style, and the one which carries the Sovereigns has large circles of diamonds set inside, among the cushions and on the roof. The Imperial crown surmounts this state carriage, which is drawn by eight white horses, each led by a postillion dressed in white and gold. —*Answers.*

ATTACKS OF PERIODIC OPHTHALMIA REPEATED SIX TIMES IN ONE HUNDRED AND SIXTY-ONE DAYS. PRESERVATION OF THE EYE.

This case, reported by Trinchera, is interesting because, in spite of the frequency of the attacks, the eye has remained normal. At the time of purchase the eyes presented a perfectly normal appearance without any signs of disease. Twenty-eight days after the purchase the right eye became opaque, and six days later it became normal. The second attack occurred nine days afterward. The other attacks occurred successively at intervals of thirty-two, twenty-nine, twenty-seven and twenty-seven days, six attacks in 161 days. During this time the eft eye remained healthy, the right eye alone being

attacked, recovered its normal appearance and showed nothing that it ever had been affected.

The therapeutic treatment was very simple. During the first three attacks it was treated with compresses and an infusion of camomile flowers containing a 3 per cent boric acid solution. During the last three attacks the eye was treated with a collyrium consisting of a 1 per cent solution of sulphate of atropia. The remarkable feature of this case is the frequency of the attacks and the integrity of the eye afterward.—*Journal de Médécine Véterinaire*, September, 1896.

PATHOGENESIS OF SPLINTS.

Joly, after numerous *post-mortem* examinations, believes that the majority of the lamenesses of young cavalry horses are caused by exostoses of the region of canon, and among these the most frequent are situated upon the posterior border of the rudimentary metacarpal bone. According to him these exostoses are due to the overstretching of the carpal sheath. This fibrous arch, a continuation of the antibrachial aponeurosis, is continued over the canon and inserted, in fact, upon the posterior border of the splint bones. It is strongly tensed when the knee is in extension, and it can thus be understood how excessive traction at the point of insertion may determine periostitis.

The intermetacarpal splints generally attributed to the gliding of the splint bone upon the canon bone, has, according to Joly, the same origin as the post-metacarpal splint. Barrier has classified the exostoses of the canon as follows: (1) Splints from concussion; (2) splints from fracture of the splint bones; (3) splints from excessive fibrous tension, which may be divided as follows:

1. Splints of the intermetacarpal or interosseous ligament.
2. Splints of the metacarpal sheath.
3. Splint of the suspensory ligament of the fetlock or, deep metacarpal splints due to excessive traction of this ligament at its point of attachment to the canon bone.
4. Splints of the head of the splint bone due to the traction of the lateral ligaments of the knee at their inferior insertion.
5. Inferior splint, or splint of the fetlock, due to the efforts of the lateral ligament of the fetlock at its superior insertion.—*Rev. Vet.*, October, 1896.

GLANDEROUS APPENDICITIS AT THE POINT OF THE CECUM.

Vecchi calls attention to a long period during which glanders was supposed to be confined to the respiratory apparatus, and that localizations in the brain and intestines have only recently been noticed. He insists upon the danger of contagion from intestinal glanders, especially if it is not recognized. In addition to the three cases published by Boschetti, that of Miscellone, four of Aostoff, Vecchi—assistant at the Institute of Pathology and the Medical Clinic at the University of Berne—has added four new cases.

The following is a description of one of them: A glandered horse belonging to the regiment was killed August 2, 1893. At the necropsy made by Boschetti a typical glanderous appendicitis was found, numerous and characteristic glanderous nodules were distributed underneath the serous and mucous membranes at the point of the cecum; besides, an ulceration of the mucous membrane was found.

The nodules were in various stages of development, some translucent and others undergoing caseous and calcareous degeneration.

Another case reported by Vecchi merits special mention. The subject was a horse destroyed by experimental tetanus. Clinically there were no symptoms of glanders and the patient presented no objective sign. The animal was tested with mallein and, showing a reaction, was suspected. Nothing was found in the nose, but at the necropsy the lesions of glanderous appendicitis found above were discovered, nodules and ulcers of the mucous membrane. This observation, says the author, demonstrates the usefulness of malleinization, as well as the clinical interest centred in the existence and even the frequency of cecal glanders.—*Jour. de Méd. Vét.*, September, 1896.

EXPERIMENTS UPON THE ELIMINATION OF THE LARVÆ OF THE BOT FLY IN THE HORSE.

Professor Perroncito, of the Veterinary School of Turin, has endeavored to effect the expulsion of this parasite in the horse by the administration of sulphide of carbon, given in gelatin capsules. Knowing the antiparasitic properties of sulphide of

carbon, he concluded to make some experiments. On this point Togsni, remount depot veterinarian, made two interesting records. In his first report he considers fifteen colts; the coat was stiff and staring, the condition poor and indicated that the colts were infested with the bot. Besides, in two or three of these the parasite was seen escaping with the feces.

Each gelatin capsule contained ten to twelve grams (two and a half drachms) of sulphide of carbon. Each one of these colts received four of these capsules at intervals of one hour, a total quantity of forty-eight grams (ten drachms). In the evening they received the usual amount of feed and the next morning a purgative consisting of castor oil. About one hour after the administration of the sulphide, there was abundant salivation and champing of the jaws. In three there was evidence of nervous excitation. In all there was as a more or less noticeable period of coma. The third day after the administration of the capsule the expulsion of the œstrus commenced, and all were dead. Each animal discharged a number varying from fifteen to fifty-six, and, in all, 592 were collected.

In the second report this same veterinarian treats in a similar manner ten other colts. Considering that in the first experiment all the larvæ expelled were dead, he omitted the purgative. Nevertheless, on the third day there took place, as in the preceding cases, the expulsion of the bot and the number varied from three to 105 per animal.

Another military veterinarian, Bugarli, treated with sulphide of carbon two horses in a bad condition and in whose feces the larvæ of the bot fly were found from time to time. He administered to each one three capsules enclosing ten grams each of sulphide of carbon and the next morning the purgative. One of the horses expelled 230 larvæ, the other twenty-three. All these observations are indicative of the efficacy of sulphide of carbon in cases of bot in the stomach. After having collected these cases and those which the author already possessed, Perroncito thinks that the dose of sulphide of carbon given in one capsule should be ten grams for adult horses and eight grams for colts.—*Jour. de Méd. Vét.*, September, 1896.

PROCEEDINGS OF SOCIETIES.

ANTHROPOLOGICAL SOCIETY OF WASHINGTON.

The 246th regular meeting of the Anthropological Society was held Tuesday, March 3, 1896. Surgeon-General George M. Sternberg read a paper on "Vivisection, its Objects and Results."

In the course of his paper Dr. Sternberg said that by dissection of dead plants and animals only can we determine the nature of their functions. The study of the results of disease processes in the post-mortem room cannot settle questions, he said, relating to the etiology of disease, its mode of transmission, if infectious, its clinical history or its treatment. These are questions which concern patient and physician, and scientific medicine depends upon their solution by scientific methods, that is, by experiment.

Progress in the biologic sciences calls for experiments on living things. The term vivisection originally related only to cutting operations upon living animals. Its use has been extended by those who have been led to enter upon a crusade against experiments on living animals, so that now it includes all experiments to which they are subjected.

Thus, said the speaker, the injection of bacteria under the skin of a guinea pig becomes vivisection. It is by experiments of this kind that our knowledge of disease germs has been acquired, and without such experiments it would be absolutely impossible to distinguish the harmless bacteria and the deadly germs of tuberculosis, cholera, typhoid fever, puerperal fever, anthrax and the like, which are now well known in pathological laboratories.

Such experiments have resulted in an immense saving of human life, yet the anti-vivisectionists insist that they are unjustifiable, and would enact measures calculated to entirely arrest all profitable research in this most important department of human knowledge.

Continuing, General Sternberg said that when the dissection of dead plants and animals was first practiced there was great opposition to it on the part of those who did not realize what

could be accomplished thereby. One great fault that has seriously retarded the progress of medicine is that there has been altogether too much deduction from insufficient data. This is proved in part in other departments of life by a curious feature of the times, the revival of interest in palmistry, faith cure and matters of that sort, and the absolute reliance which a great many people place in the virtues of patent medicines as panaceas for all ills. If one controverts the views of a believer in any of these he will be met by the recital of some particular incident, unsupported, which answers the purpose of absolute proof to the credulous. This sort of credence is not altogether lacking in the medical profession. Final conclusions cannot always be reached by chemical methods, but much must be done by hospital experiments. These often furnish extremely valuable additions to our scientific knowledge, but it is not always possible to carry these experiments sufficiently far. Fuller and more valuable results may often be obtained by experiments on the lower animals in the hands of a master.

He quoted, in support of his position, the story of one of Pasteur's experiments by means of which, sacrificing the lives of a few animals, he discovered the bacillus of anthrax, and thereby saved the lives of millions of animals. The fact that anthrax inoculation is now so generally practiced was due to Pasteur's work, which could never have been carried through without vivisection. Formerly ten per cent of all the sheep and five per cent of all the cattle in France died from this disease, and his study of the malady has resulted in a saving, in France alone, of 5,000,000 francs a year for sheep and 2,000,000 francs' worth of cattle. He also spoke of Pasteur's experiments on the subject of hydrophobia, pointing out the tremendous blessings which have accrued to the human race from the work of the famous French scientist, a work, however, which necessitated the sacrifice of a few animals. As a result of his experiments and study, mortality from hydrophobia among human beings has been reduced to less than one per cent. In a record of 416 cases of people who had been bitten by animals known beyond question to have been mad, treated by Pasteur's method, not one died.

Vivisection has resulted in a great increase in the exactness of medicine and surgery, and any further progress in biology calls for experiments upon living things. In the consideration

of vivisection is placed on the one side the tremendous advance in science, the increased immunity from disease and the great saving to the material wealth of the world, while on the other side of the balance is the thought of the animals, comparatively few in number, which have been sacrificed. As human lives are too sacred to risk in solving the questions of pathogenic potency, we resort to lower animals, and vivisection has resulted in a great saving of human life. The painful dissections made by the early investigators, and necessary in the beginning, are rarely, if ever, made nowadays. The statements presented by the ultra anti-vivisectionists that unnecessary cruelty is used and that many experimenters seem to take an actual delight in the sufferings of their victims, General Sternberg characterized as a gross and unfounded calumny. Vivisection is practiced by members of the humane profession of science in the interest of humanity. Those who deny that any valuable results have ever accrued from vivisection simply show how ignorant they are, and only prove themselves fit subjects for a course of elementary lectures.

The discovery of anti-toxin is one of the blessings that has resulted from experiments upon the lower animals. Scientists would have to stop just where they are to-day if they were prevented now altogether from the practice of vivisection. In securing the anti-toxin, very little suffering is inflicted upon the horse, from which it is obtained, but it must then be tested upon guinea-pigs to determine its character and potency. If we object to using guinea-pigs for this purpose, then we are compelled to act blindly and must take our chances with the children.

In conclusion, Dr. Sternberg characterized as well meaning, but ill advised, the efforts of those people who seek, by organization, agitation, and in every other way to hinder or absolutely put a stop to a practice which is recognized as necessary to any further advance in scientific medicine.

Dr. Baker considered the question from the physiological point of view. He reviewed the history of the study of the human body from the earliest days down, showing the crude ideas which were entertained on the subject by Hippocrates and other physicians of long ago. He traced the development down to the present time, recounting the experiments which were necessary, and which were made from time to time,

without which we would know no more of the functions of the human body than did Galen. Harvey was an enthusiastic vivisectionist, and if he had not been, he could never have discovered the circulation of the blood. That he did discover it resulted from the fact that he cut into the thorax and saw the blood coursing through the arteries and the heart beating. To ask scientists to study anatomy without seeing what is actually within the body would be precisely the same as to ask a man to study the mechanism of a mill by standing outside and listening to the noise of the spindles.

Dr. Salmon, Chief of Bureau of Animal Industry, spoke of the role vivisection had played in the discoveries of, (1), Anthrax by Koch, (2) Chicken Cholera bacillus of Pasteur, (3) Immunity as first advocated by the Bureau of Animal Industry, and (4) the discoveries and researches in Antitoxin based upon this doctrine. He also cited the millions of lives and money saved by the investigations in pleuro-pneumonia, hog cholera, Texas fever and tuberculosis, which had become of international interest, due to the exclusion of our cattle from France and Germany.

Mr. Kennedy, of the Anti-vivisection Society, defined the term "vivisection" so as not to include inoculation, and claimed that their purpose was to have governmental supervision over experiments, and based his arguments solely on sentimental grounds, claiming that since many experiments had failed therefore it was cruelty to animals destroyed in these unsuccessful attempts.

Dr. Ch. Wardell Stiles spoke of the utility and results of animal experimentation in comparative invertebrate zoölogy as applied to human and comparative medicine. He made the general statements, 1. That all animals are infested with animal parasites. 2. That some parasitic diseases may be treated successfully while others cannot; in this latter case we must deal with prevention rather than cure. 3. A study of the embryological phases of the parasites is necessary before we can establish satisfactory prophylactic measures. 4. The data regarding the embryology including life-history can be obtained only through animal experimentation.

The speaker next cited some of the better known parasitic diseases of man and the various domesticated animals and showed the various steps by which the zoölogist had placed

the medical profession in a position to meet these maladies. Trichine spiralic (Trichina spiralis) was first described in 1835 as a harmless parasite; its life history was discovered in 1850, but not until 1860 was it shown to be the cause of a well-defined disease which up to that time had been confounded with typhoid fever. Its life history as well as the various prophylactic measures were discovered by experimentation and could have been obtained in no other way. The same is true regarding tape worms and flukes. Through a study of the embryology of these parasites by means of animal experimentation data have been obtained for the proper methods of prevention.

The study of animal parasites bears a close relation in differential diagnosis to the bacterial diseases, for verminous nodular diseases are found in cattle, sheep, chickens, etc., which resemble tuberculosis and are often mistaken for it.

Regarding anesthetics Dr. Stiles said that they could not be used in his line of work as it was necessary to keep an animal under observation for several days, weeks or even months at a time. He was firmly of the opinion, however, that the inconvenience suffered by the animals in experiment was, in the vast majority of cases more of the nature of weakness than of actual physical pain. He claimed that the appetite of the animals was an excellent index to the amount of pain they suffered, since an animal in severe pain refused food. In experiments with animal parasites the hosts nearly always retained their appetites, and the speaker maintained that even in the severe experiments the pain suffered by the animals was almost insignificant when compared with the pain a human being would suffer in the same stages of the same diseases.

J. H. McCormick,
General Secretary.

MONTREAL VETERINARY ASSOCIATION.

The meeting of the above Association was held in the library of the Faculty of Comparative Medicine this evening, November 5, Dr. Mills occupying the chair. Dr. D. McEachran, Dr. Baker, and Dr. Charles McEachran were present. There being no business, the chairman called upon Mr. Hilliard to report his case.

This was one of Lithotomy, performed on an aged gelding in which a calculus had been diagnosed loose in the bladder, causing frequent attempts at urination. Owing to the size of the obstruction, which proved to weigh 1740 grains (about the size of a hen's egg), the following operation was performed: An incision was made through the perineum down and into the urethra, but on bringing the obstruction to the neck of the bladder by means of the forceps, and the hand

introduced into the rectum, it was found to be too large for removal. An incision therefore was made in the neck of the bladder, by means of a concealed knife, after which the calculus was withdrawn without difficulty Slight hermorrhage followed the operation, but an injection of cocain having been given, the animal evinced but little pain, merely arching his back during the passage of the stone, and eventually made a good recovery.

Mr. Connelly followed with a paper on Influenza, tracing its history from the time when it was recognized as an epizootic among the war horses of Rome, and later, in 1776, visiting America, where it has existed up to the present time. Horses about the age of four or five are most liable to an attack, one of which is supposed to give immunity. A period of incubation of from five to seven days occurs before any symptoms present themselves, after which they may be so slight as to attract but little attention, but on the other hand, are most frequently serious and present the appearance of rapidly developing fever, with marked depression. When accompanied by grinding of the teeth a severe attack may be expected, the temperature occasionally rising to 107° Fah. in the first twelve hours. The conjunctiva is edematous, and this, with excessive lachrymation, has given rise to the name Pink Eye. The disease may terminate rapidly and favorably or complications of almost any organ may ensue, in the former case the duration does not exceed from four to eight days.

Treatment—While the appetite remains, the patient should have a moderate quantity of fresh clover if it be obtainable, warm bran mashes, boiled oats or linseed meal. Clothe the body and extremities, and place the animal in a well-ventilated loose box. Antipyretics are indicated. Bleeding is questionable treatment and, if employed, must be at the outset of the disease. Steaming the head is good practice, as it relieves the cough and nasal discharge. When much debilitated, stimulants should be used, and in connection with a weak heart digitalis has proved advantageous.

In the discussion which ensued, the following interesting points were mentioned by Dr. D. McEachran, namely :—That complications affecting certain organs were generally due to some previous disease of said organ having left it in a weak condition, and therefore predisposed to disease. In all cases there is a cellulitis and thickening of membrane. He said that, in his opinion, the disease was of microbic origin, the specific germ of which he was sure would ere long be demonstrated. Dr. Baker pointed out that in differential diagnosis between an ordinary cold and influenza, one should take into consideration that in the latter great depression is present, and that a large number of animals are similiarly affected without any apparent cause. He recommended the administration in the drinking water of one dram of nitrate of potash and one ounce of magnesium sulphate three times a day; as a sequel, he described swelling, principally of the flexor tendons, accompanied by shifting or rheumatic lameness. Dr. Charles McEachran drew attention to the general occurrence of roaring as a result of influenza, it probably being due to an enlarged condition of the bronchial lymphatic glands, interfering with the function of the left recurrent laryngeal nerve, and pointed out the importance of this circumstance as regards a certificate of soundness, which he recommended should not be given without modification during the first three months following influenza.

The proceedings then terminated.

B. A. SUGDEN,
Secretary and Treasurer.

VETERINARY ASSOCIATION OF NEW YORK COUNTY.

The regular monthly meeting was called to order Wednesday, November 4, 1896, by the president, Dr. R. S. Huidekoper, at the Academy of Medicine.

On roll call, the following members responded, viz.: Drs. Delaney, Ellis, Foy, Giffen, Gill, Huidekoper, Hanson, Jackson, Lamkin, MacKellar, Neher, O'Shea and Robertson (13).

Report of Board of Censors.—Dr. Gill, chairman, reported favorably on the names of the gentlemen who had applied for membership; but owing to a slight error in the form of applications, the chair directed that the names be withdrawn for action until the application be presented in proper form. The board also recommended to the society that the secretary be authorized to notify all members eighteen months in arrears, that if said arrears were not settled by the next meeting their names would be dropped from the roll. Report accepted.

Reports of Cases.—Dr. Gill reported a case of osteo-porosis, which was discussed by Drs. Hanson, Neher, Robertson and others.

Dr. Giffen reported a case of hemorrhage from the lungs in a horse, with recovery, followed by a relapse ten days later which resulted in death in ten minutes from time of attack. This case was freely discussed by Drs. Robertson, Gill, Neher and Hanson.

Dr. Robertson then reported a post-mortem which revealed osteo-sarcoma, which had been diagnosed as a case of pharyngeal paralysis. A very interesting discussion followed by Drs. Gill, Hanson, Jackson and others.

Dr. Gill next reported a case of prolapse of the vagina in a bitch, and Dr. Jackson a case of fracture of the facial bones.

Reports of other Committees.—Judiciary Committee, Dr. O'Shea, chairman, reported that the committee had a warrant out for one illegal practitioner, to be served as soon as they can locate his present abode; and that they have other cases on which they are going to proceed immediately; and that in reference to the case of compelling a practitioner to remove an assumed degree from after his name, the committee would consult the Association's counsel before proceeding.

Report accepted.

Committee on Board of Health Question, Dr. Robertson, chairman. This committee asked permission to report progress, promising to have a written report for December meeting. Report accepted.

New Business.—Resolution offered by Dr. Hanson, and signed by Drs. O'Shea and Gill, that an amendment be made to Article IV of the Constitution, in reference to annual election of officers, so as to correspond to change in Article XIII of the By-laws, to read as follows: "Annual election shall take place in the evening of the first Wednesday in December. Resolution accepted.

The secretary was authorized to purchase a rubber stamp, to be used to stamp the face of application blanks. Moved and seconded that the initiation fee of five dollars must accompany the application for membership. Carried.

The secretary was authorized to notify members that election of officers will take place in the evening of the first Wednesday in December.

Adjourned.

ROBERT W. ELLIS, D. V. S.,
Secretary.

McGILL UNIVERSITY,

Faculty of Comparative Medicine and Veterinary Science,

LATE

MONTREAL VETERINARY COLLEGE.

The Principal (*ex-officio*):
SIR W. DAWSON, C.M.G., LL.D., F.R.S.

Professors:

D. McEACHRAN, F.R.C.V.S., V.S., Edin., D.V.S., 176 University Street.
M. C. BAKER, D.V.S., 87 Mansfield Street.
CHARLES McEACHRAN, D.V.S., 909 Sherbrooke Street.

Associate Professors:

G. P. GIRDWOOD, M.D., 82 University Street.
GEO. WILKINS, M.D., 896 Dorchester Street.
D. P. PENHALLOW, B.Sc., 111 Union Avenue.
WESLEY MILLS, M.A., M.D., D.V.S., 122 Lansdowne Avenue.
A. D. BLACKADER, B.A., M.D., 236 Mountain Street.
J. G. ADAMI, M.A., M.D. [Cantab.], McGill University.

Dean: D. McEACHRAN.

Registrar: CHAS McEACHRAN.

SESSION 1897-8.

Opens First Week in October.

The complete course of study in this Faculty extends over three years. Graduates of recognized Medical Colleges are allowed to present themselves for examination after regular attendance on one full course; graduates of recognized Agricultural Colleges in which Veterinary Science constitutes a branch of study, after regular attendance for two full courses.

McKILLIP VETERINARY COLLEGE,

CHICAGO.

The course of instruction at this College is systematic and thorough, giving a complete professional education. The College is backed by the largest veterinary practice in the country, with the greatest opportunities for practical instruction, while at the same time it pursues the highest scientific work in its bacteriological laboratories for the production of blood serum preparations. The course commences in October and extends over three years with six months duration. Students graduating from this College are eligible to membership in the U. S. Veterinary Medical Association. For catalogue and information apply to

L. A. MERILLAT, V.S., Sec'y.

No. 1639 Wabash Ave., Chicago, Ill.

UNIVERSITY OF PENNSYLVANIA

DEPARTMENT OF

VETERINARY MEDICINE.

The course of instruction is graded and extends over three years with one session beginning the 1st of October and ending at Commencement, the second Thursday in June, in each Academic Year.

Practical Instruction, including Laboratory Work in Pharmacy, Chemistry, General Biology, Histology, Physiology, Comparative Osteology, Dissecting, Botany, Pathology, Bacteriology, and Inspection of Meat and Milk, with personal care and treatment of animals in the hospital and clinics, is part of the regular course without additional expense.

Graduates of this School are eligible for membership in the United States Veterinary Medical Association.

FACULTY.

C. C. HARRISON, PROVOST and *ex-officio* President.

HORATIO C WOOD, M.D., LL.D., Professor of Materia Medica, Pharmacy, and General Therapeutics.

JOHN GUITÉRAS, M.D., Professor of General Pathology and Morbid Anatomy.

JOHN MARSHALL, M.D., NAT.SC D., DEAN OF THE FACULTY, Assistant Professor of Chemistry.

SIMON J. J. HARGER, V.M.D., Professor of Veterinary Anatomy and Zoötechnics.

LEONARD PEARSON, B.S., V.M.D., Professor of the Theory and Practice of Veterinary Medicine.

JOHN W. ADAMS, A. B., V. M. D , Professor of Veterinary Surgery and Obstetrics.

W. S. CARTER, M. D., Assistant Professor of Comparative Physiology.

DEMONSTRATORS.

ALEXANDER GLASS, V. S., Lecturer on the Theory and Practice of Canine Medicine.

ROBERT FORMAD, V.M. D., Lecturer on Veterinary Sanitary Science, and Demonstrator of Normal and Pathological Histology, and of Morbid Anatomy.

EDWIN S. MUIR, PH. G., V. M. D., Instructor in Veterinary Materia Medica and Pharmacy.

B. FRANK SENSEMAN, V. M. D., Demonstrator of Veterinary Anatomy.

JOHN HARSHBERGER, PH. D., Instructor in General Biology, Botany and Zoölogy.

MILTON E. CONARD, V. M. D., Lecturer on Veterinary Obstetrics and Demonstrator of Veterinary Surgery.

HERMAN A. CHRISTMANN, V. M. D., Assistant Demonstrator of Veterinary Anatomy.

FRANZ ENGE, Demonstrator of Forging and Horse-shoeing.

For Catalogue, address

JOHN MARSHALL, M. D., Dean,

36th and Pine Streets, Philadelphia, Pa

Harvard University,

School of Veterinary Medicine.

The course is a *graded* one of three years of nine months each.

There are unequaled facilities for practical instruction in all branches; and the Hospital, maintained in connection with the School, places a large practice under the constant observation of students.

For Illustrated Catalogue and all further information, apply to

CHARLES P. LYMAN, F. R. C. V. S., Dean,

Graduates of this School are eligible for membership in the United States Veterinary Medical Association.

Chicago Veterinary College,

Founded 1883.

Trustees, { R. J. WITHERS, President.
A. H. BAKER, Treasurer.
JOSEPH HUGHES, Secretary.

Regular session commences the first week in October in each year.

For prospectus giving all information as to curriculum, fees, etc., address the

SECRETARY, JOSEPH HUGHES, M. R. C. V. S.,
2537 and 2539 State Street, Chicago.

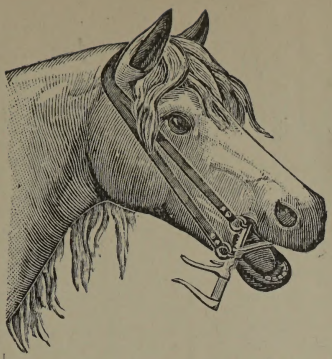
United States College of Veterinary Surgeons

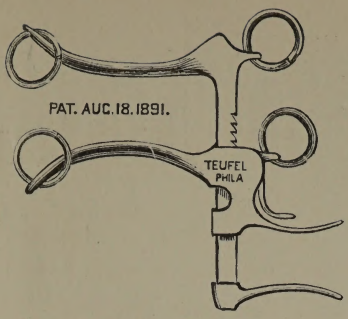
222 C STREET, N. W., WASHINGTON, D. C.

Session 1897-8
Begins October 1st.

For Prospectus and Full Information, address

C. BARNWELL ROBINSON, V. S., *Dean.*

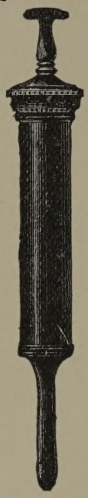




Edward's Speculum with Bridle, $6.00.

One-half oz. Hard Rubber Syringe, long nozzle, $1.00; Per dozen, $8.50.

One oz. Hard Rubber Syringe, short nozzle, 60 cents; Per doz., $6.25.



Jacob J. Teufel & Bro.,

...Manufacturers of...

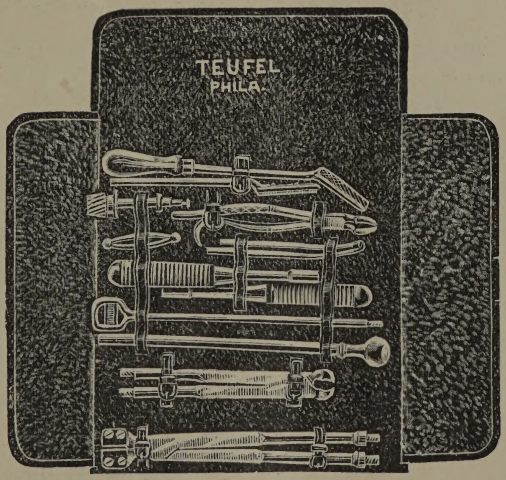
VETERINARY, SURGICAL
AND DENTAL

...INSTRUMENTS...

No. 114 South Tenth Street,
Philadelphia.

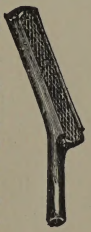
ESTABLISHED 1856.

Curved Float, $2.00.



Dental Set No. 1, $45.00.

Combined Float, Straight and Angle, $3.00.



University of the State of New York,

NEW YORK COLLEGE OF VETERINARY SURGEONS.

154 EAST FIFTY-SEVENTH ST., NEW YORK.

Chartered 1857.

The Oldest Veterinary College in America.

Abundant Clinical, Pathological and Anatomical Material; a Hospital maintained in connection with the College; new and enlarged quarters for College and Hospital, and a numerous body of experienced instructors, make the course unusually practical and valuable.

The course is graded and extends over three years, of six months each. Lectures begin annually in October. For Circulars address

H. D. GILL, V. S. Dean.

University of Pennsylvania,

DEPARTMENT OF MEDICINE.

THE 131st ANNUAL SESSION will begin Thursday, October 1, 1896, at 12 a. m. and will end at commencement, the second Thursday in June, 1897.

The Curriculum is graded, and attendance upon four annual Sessions is required. College *graduates* in Arts or Science, who have pursued certain Biological studies, are admitted to advance standing.

Practical Instruction, including Laboratory Work in Chemistry, Histology, Osteology, and Pathology, with Bedside Instruction, in Medicine, Surgery, Gynæcology, and Obstetrics, are a part of the regular course, and without additional expense.

For catalogue and announcement, containing particulars, apply to

DR. JOHN MARSHALL, DEAN,
36th Street and Woodland Avenue, Philadelphia.

UNIVERSITY OF PENNSYLVANIA.

Department of Dentistry,

36th Street and Woodland Avenue, Philadelphia, Pa.

The course of instruction is graded and extends over three years, with one session beginning first of October and ending early in June in each year.

Laboratory instruction of each student, not only in Practical Dentistry but also in Practical Chemistry and Histology, forms a prominent feature in this Department.

The appointments of the Lecture-Rooms, Operating-Room, and Laboratories, are as complete as any in America. No students admitted after October 10th. For detailed information and Catalogue address

EDWARD C. KIRK, D. D. S., Dean.